Light Liquid Sampler

SYSTEM SUPPORT MANUAL

YZ SYSTEMS
MILTON ROY

LIGHT LIQUID SAMPLER INSTRUCTION & OPERATING MANUAL

Version: 01012007

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Section 1:
First Things To Know About Light Liquid Samplers

How to Use this Manual

The Light Liquid Sampler Operations Manual is a step-by-step guide containing the procedures needed to work with the Light Liquid Sampler System.

The Light Liquid Sampler Series of samplers implement the most advanced technology available in the industry. It is recommended that the technicians working with the Light Liquid Sampler Systems study the manual prior to initiating work on the system for the first time.

Typographic Conventions

To aide in readability, this manual uses several typographic conventions. References to illustrations, photographs, and other related content will appear in *italicized text* along with the location of where to find the item in the manual. Digital versions of the manual, available in Adobe Acrobat™ PDF format, will be highlighted further in *blue italic text* indicating the copy retains a hyperlink to the referenced item.

Measurement units are listed in italic parenthesis text following their US standard equivalent. As an example, for defining a distance, 15' *(4.5 meters)*, is how the text will appear throughout the manual.

Items that require action, for example the pressing of a key for programming the controller, will feature the action item in sentence case **Bold Text** followed in normal text by the item such as, the **Up Arrow** key or **Main Power** switch.

Getting Help

This manual provides solutions to typical questions about the Light Liquid Sampler system. If the answer can not be found within this manual, contact YZ Systems at:

T: 1.281.362.6500
T: 1.800.653.9435
F: 1.281.362.6513
Em: Service@yzhq.com

When calling, have this manual close at hand. Whether calling or writing, please include in your communique the following information:

- The serial number of the Light Liquid Sampler System and the version number of this manual. The serial number is located on the system skid or enclosure. The version number of this manual is located at the bottom of each page.

- A description of the problem and, if applicable the actions of the technical personnel when the problem occurred.

SECTION 1:
FIRST THINGS TO KNOW ABOUT LIGHT LIQUID SAMPLERS

Operation Specifications

Maximum Output:	
Std. 3/8" Plunger	6.8 gallons/day *(25.3 liters/day)*
Opt.1/2" Plunger	12.17 gallons/day *(46.07 liters/day)*
Opt.5/8" Plunger	19.02 gallons/day *(72.0 liters/day)*
Opt.1" Plunger	24.34 gallons/day *(92.07 liters/day)*
Maximum Operating Pressure:	1,800 psig *(124 Bar (g)*
Pump Displacement:	
Std. 3/8" Plunger	.25 - 1.8 cc/Stroke
Opt.1/2" Plunger	0.8 - 3.2 cc/Stroke
Opt.5/8" Plunger	1.25 - 5.0cc/Stroke
Opt.1" Plunger	1.6 - 12.8cc/Stroke
Operating Temp Range:	0 to 140 degrees F. *(-17°C to 60°C)*
Power Supply Options:	
Pneumatic	120 VAC @ 1 AMP VDC
Hydraulic	120 VAC @ 20 AMP
Flow Signal:	*Customer Supplied
Actuation Gas;	100 psi Instrument Quality Gas

Note: *at temperatures below 32º F (0º C), conditioning of the actuation gas supply may be required. Where the actuation gas supply has a high water content and/or a low hydrocarbon dew point, additional actuation gas filtration or heating of the actuation gas supply may be necessary. Bottled nitrogen can also be used during cold operating conditions to avoid condensation in the actuation gas supply line. In addition, operation at extreme temperatures may affect system performance. To enhance the performance of this system, adequate heat should be provided to maintain an operating environment above 30° F (-1º C).*

***** *Refer to Manual Section 4, System Control Options*

Section 1:
First Things To Know About Light Liquid Samplers

Theory of Operation

The Light Liquid sampling systems are designed to sample light liquid hydrocarbons. Thousands of individual samples are captured and combined to develop a representative, composite sample of the flowing pipeline.

Operation of the sampling system centers around the following primary components: the Sample Pump, the Product Accumulator Vessel, the Precharge Gas Vessel, and the Electronic Control System. All equipment, except probe mounted Sample Pumps are mounted on a steel skid, or in a system enclosure. These components are shown in the diagrams on the following pages.

The sampling system operates on a simple concept. When the system receives a proper flow signal (by others), the electronic control unit energizes either a solenoid valve, or a Hydraulic Power Pack. Energizing the solenoid valve, or Hydraulic Power Pack allows a pressurized pulse into the actuation cylinder of the sample pump, which in turn causes the pump to stroke. When the pump strokes, a small sample is displaced into the product accumulator vessel. Once the solenoid valve, or Hydraulic Power Pack is de-energized, the sample pump plunger returns to its normal position. This action allows a new sample bite to be captured in the pump.

The purpose of the YZ light liquid hydrocarbon sampling system is to capture and maintain a representative liquid sample of the pipeline product. The sampled product is maintained in a liquid phase by the product accumulator vessel's free floating piston and the precharge gas system. In order for the system to function properly, pipeline product must be single phase, liquid product.

By properly adjusting both the sample size and the sample frequency, the sample vessel will fill to 80% capacity at the end of the sample period. Once the sample period is complete, the product within the sample receiver is thoroughly mixed using the power mixer. A representative sample can then be removed from the product accumulator vessel using the YZ DuraSite, a DOT approved constant pressure sample vessel, refer to page 72-73.

After removing the remainder of the product from the accumulator vessel, the system is then ready for a new sample period.

System Accessories

- **DuraSite**, portable DOT approved constant pressure sample vessels. Available in 150, 300, 500, 800, and 1000 cc sizes.
- **KK-1, KK-2, & KK-3:** carrying cases for DuraSites that meet DOT requirements for transporting portable sample vessels.
- 1/4" stainless steel tubing **Dielectric Isolator Union**. These should be installed in every tubing line that attaches the sampler to the pipeline in any manner. For example the supply gas, product connection to the system, and differential pressure switch connections, *(P/N A1-0182)*.

A complete line of sampling accessories ranging from sample probes to sample vessels is available through YZ - Milton Roy. Please contact your local representative or YZ - Milton Roy toll free at 800.344.5399. For technical support call 800.653.9435.

Section 1:
First Things To Know About Light Liquid Samplers

Notes

SECTION 2: SYSTEM INSTALLATION

Standard Probe Mounted Pump (PNR) System Components

Standard primary components of the Probe Mounted Pump System (PNR-2) include the following:

- **Sample Pump/Balance Valve,** *figure 1*. Pneumatically or Hydraulically actuated PNR-2 probe mounted Sample Pump.

- **System Skid**, *figure 2 (Pneumatic), figure 3 (Hydraulic), & figure 4 (Both)*. Houses the Accumulator Vessel, Pre-charge Vessel, and System Electronics Enclosure.

- **Product Accumulator Vessel,** *figure 2 (Pneumatic Skid), figure 3 (Hydraulic Skid), figure 4 (Both), & figures 5 & 6 (Cabinet Type)*. 1.5 gallon (5.68 *Liters),* 3 Gallon *(11.36 Liters),* 5 Gallon *(18.93 Liters).*

- **Pre-Charge Vessel,** *figure 2 (Pneumatic Skid), figure 3 (Hydraulic Skid), figure 4 (Both), & figures 5 & 6 (Cabinet Type)*. Sized to match Product Accumulator volume.

figure 1

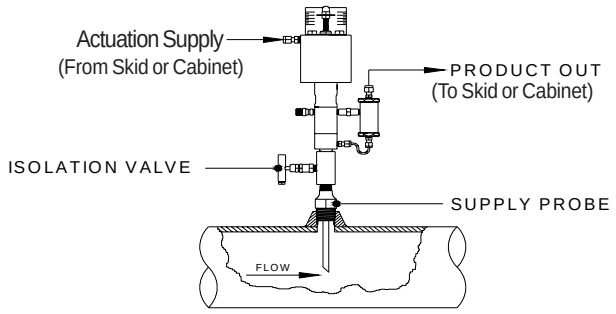


figure 2

Pneumatic

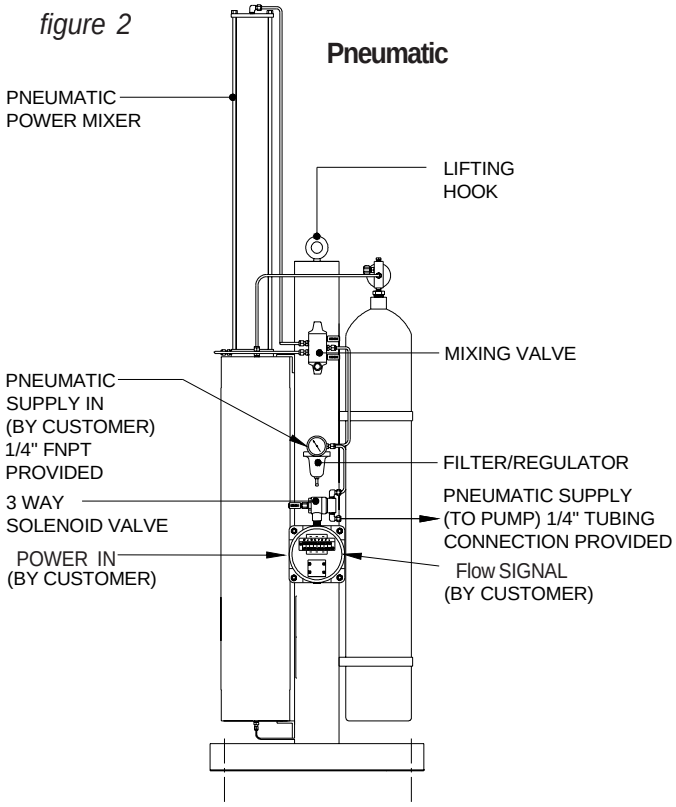
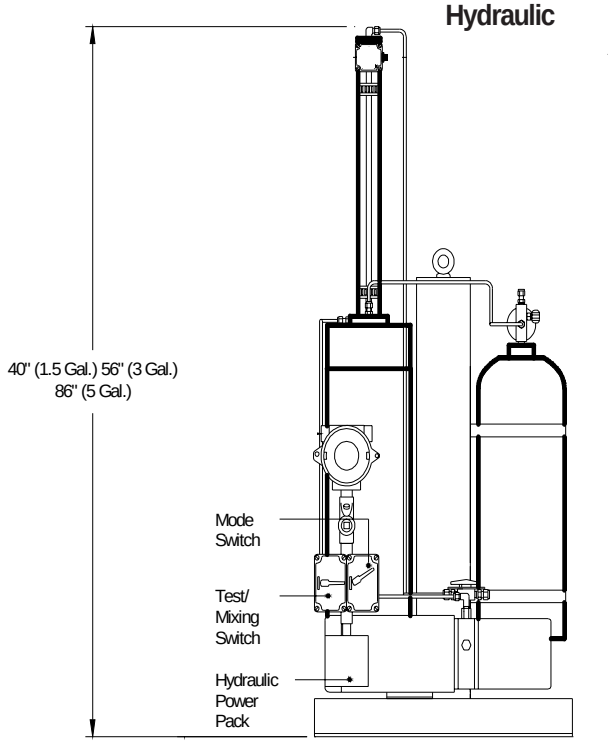


figure 3

Hydraulic

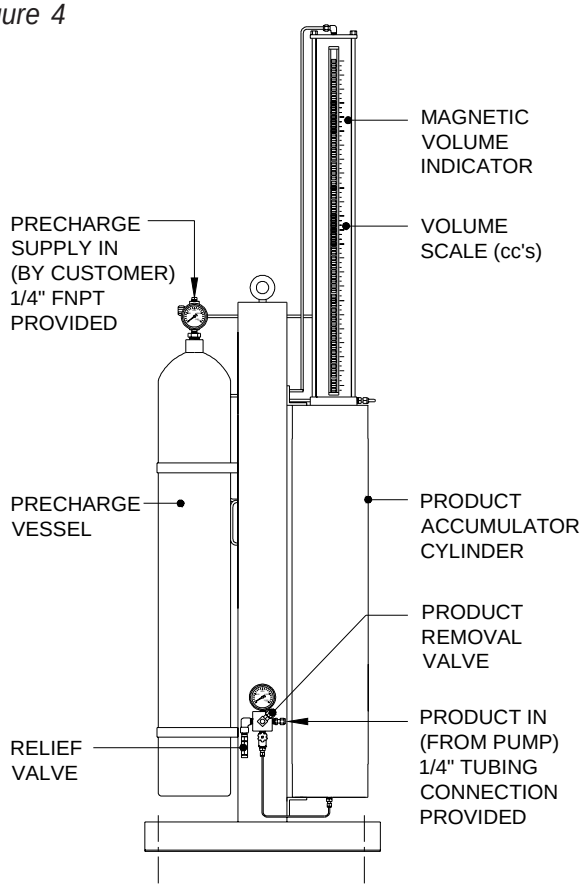


SECTION 2: SYSTEM INSTALLATION

Standard Probe Mounted Pump (PNR) System Components

- **Five-Way Cross,** *figure 4 (Skid) & figures 5 & 6 (Cabinets)* mounts the Pressure Gage, Relief Valve, Product Isolation, and Product Removal Valves.

figure 4

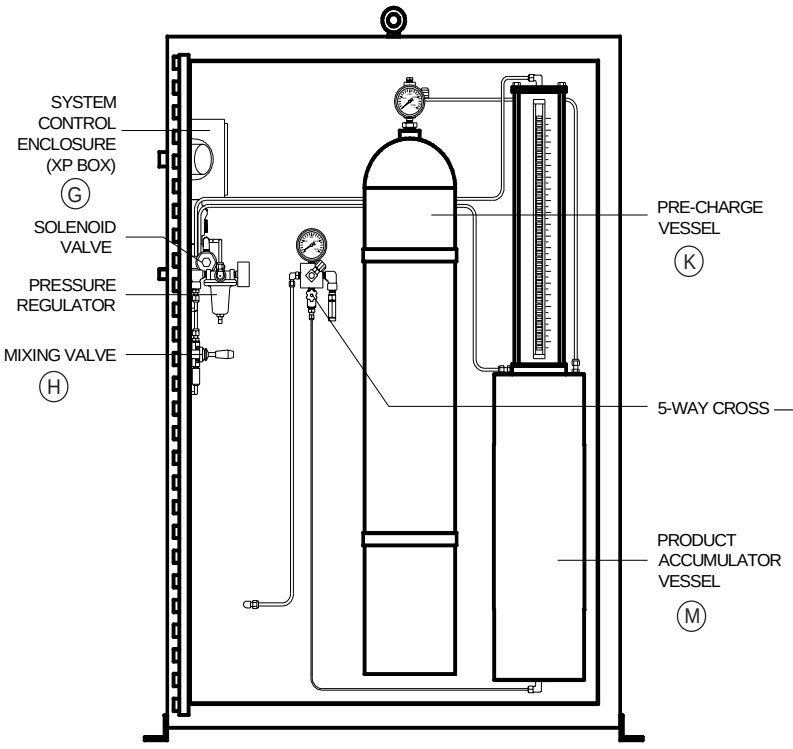


SECTION 2: SYSTEM INSTALLATION
Standard Probe Mounted Pump (PNR) System Components

- **System Cabinet**, *figure 5 (Pneumatic) & figure 6 (Hydraulic)*. Houses the Accumulator Vessel, Pre-charge Vessel, Five-Way Cross, and System Electronics Enclosure.

figure 5

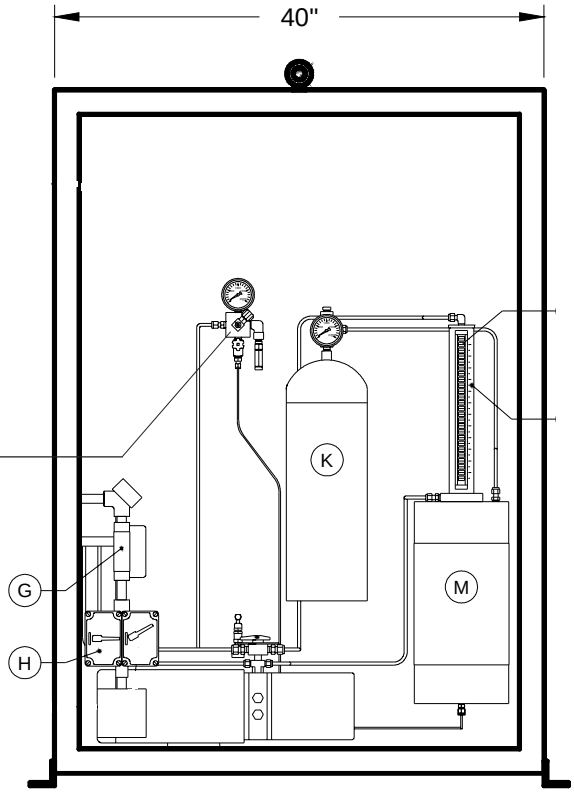
Pneumatic



FRONT

figure 6

Hydraulic



FRONT VIEW

ENCLOSURE DOOR SHOWN REMOVED FOR DRAWING CLARITY.

SECTION 2: SYSTEM INSTALLATION

Standard Skid Mounted Pump (LPR) System Components

Standard primary components of the Skid Mounted Pump System (LPR-2) include the following:

- **System Skid/Cabinet**, *figure 7, figure 8, figure 9, figure 10, figure 11, and figure 12*. Houses the Sample Pump, Accumulator Vessel, Pre-charge Vessel, Five-Way Cross, and System Electronics.
- **Sample Pump/Balance Valve,** *figure 7, figure 9, figure 11, and figure 12*. The LPR-2 slip stream Sample Pump is mounted either; on the front of the sampler skid, or inside the cabinet.
- **Product Accumulator Vessel,** *figure 7, figure 8, figure 9, figure 10, figure 11, and figure 12*, 1.5 gallon (5.68 *Liters),* 3 Gallon *(11.36 Liters),* 5 Gallon *(18.93 Liters).*
- **Pre-Charge Vessel,** *figure 7, figure 8, figure 9, figure 10, figure 11, and figure 12*. Sized to match Product Accumulator volume.
- **Five-Way Cross,** *figure 7, figure 9, figure 11, and figure 12*. mounts the Pressure Gage, Relief Valve, Product Isolation, and Product Removal Valves.
- **Pneumatic System,** *figure 8, and figure 11*. Provides power for the Sample Pump actuation, and the Mixing system for the Product Accumulator Vessel.

figure 7

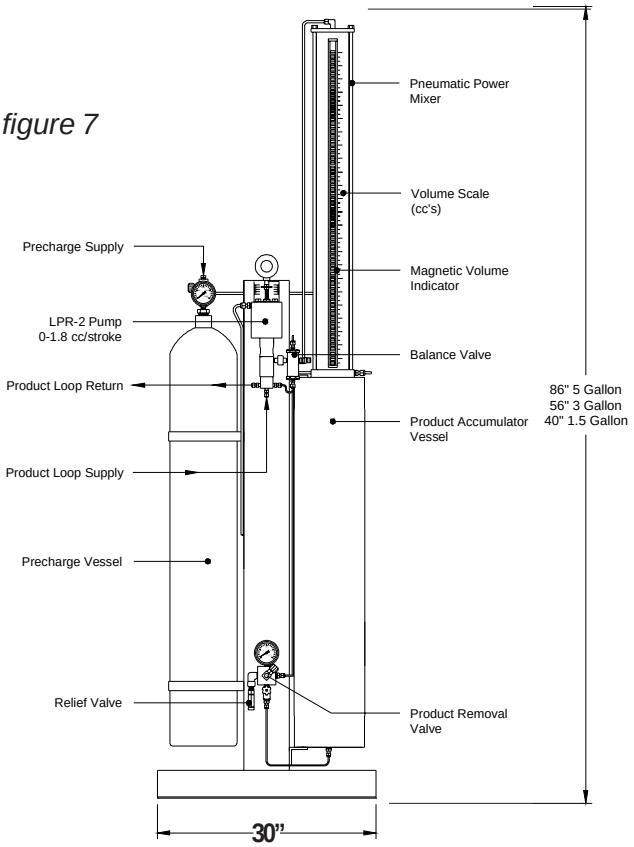
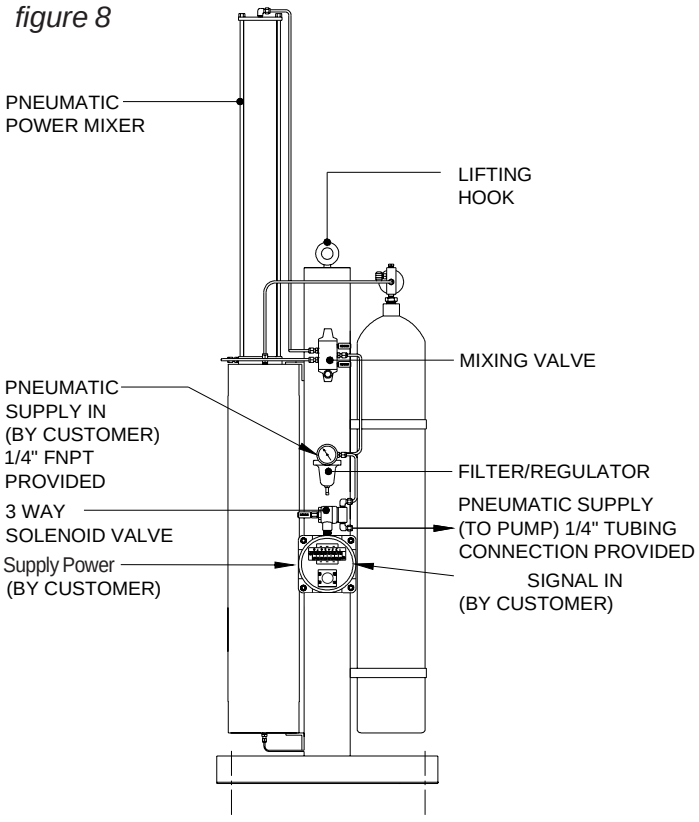


figure 8



SECTION 2: SYSTEM INSTALLATION

Standard Skid Mounted Pump (LPR) System Components

- **Hydraulic PowerPak,** *figure 10 & figure 12*. Provides hydraulic power for the Sample Pump actuation, and the Mixing system for the Product Accumulator Vessel.

figure 9

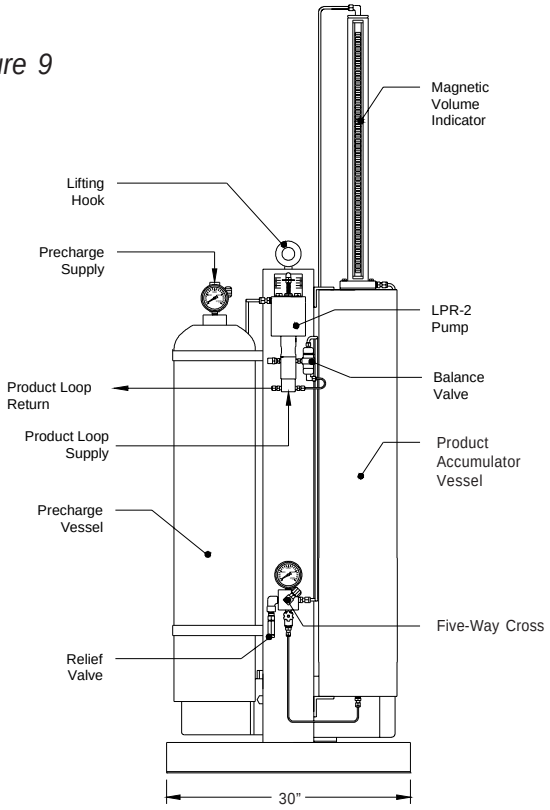
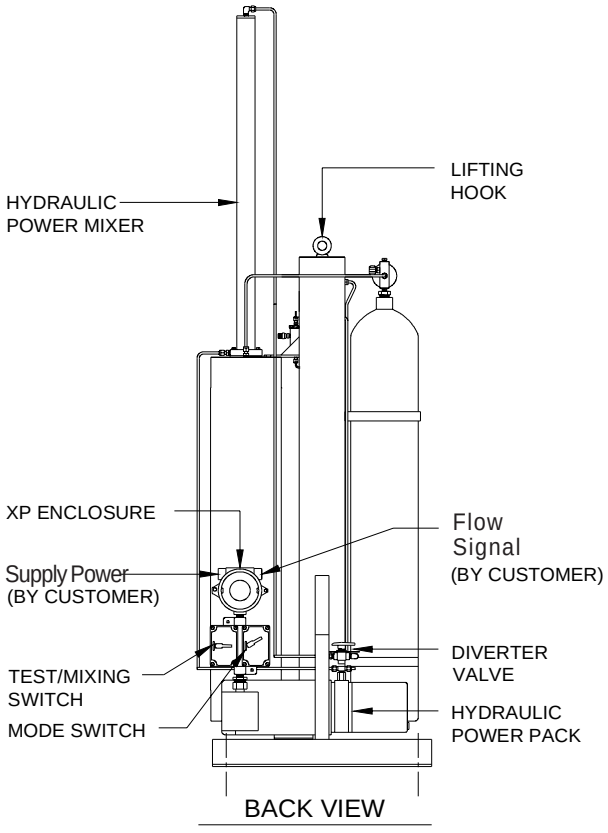
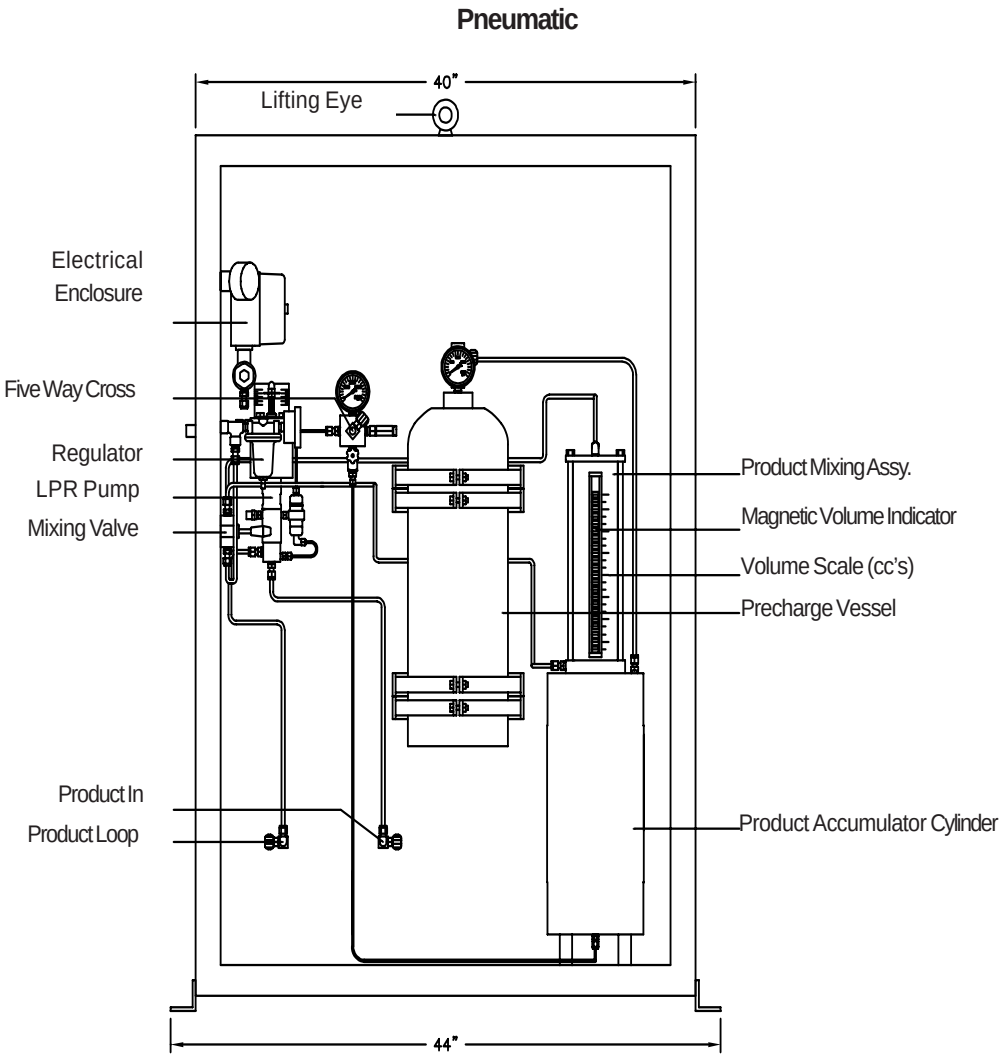


figure 10



SECTION 2: SYSTEM INSTALLATION
Standard Cabinet Mounted Pump (LPR) System Components

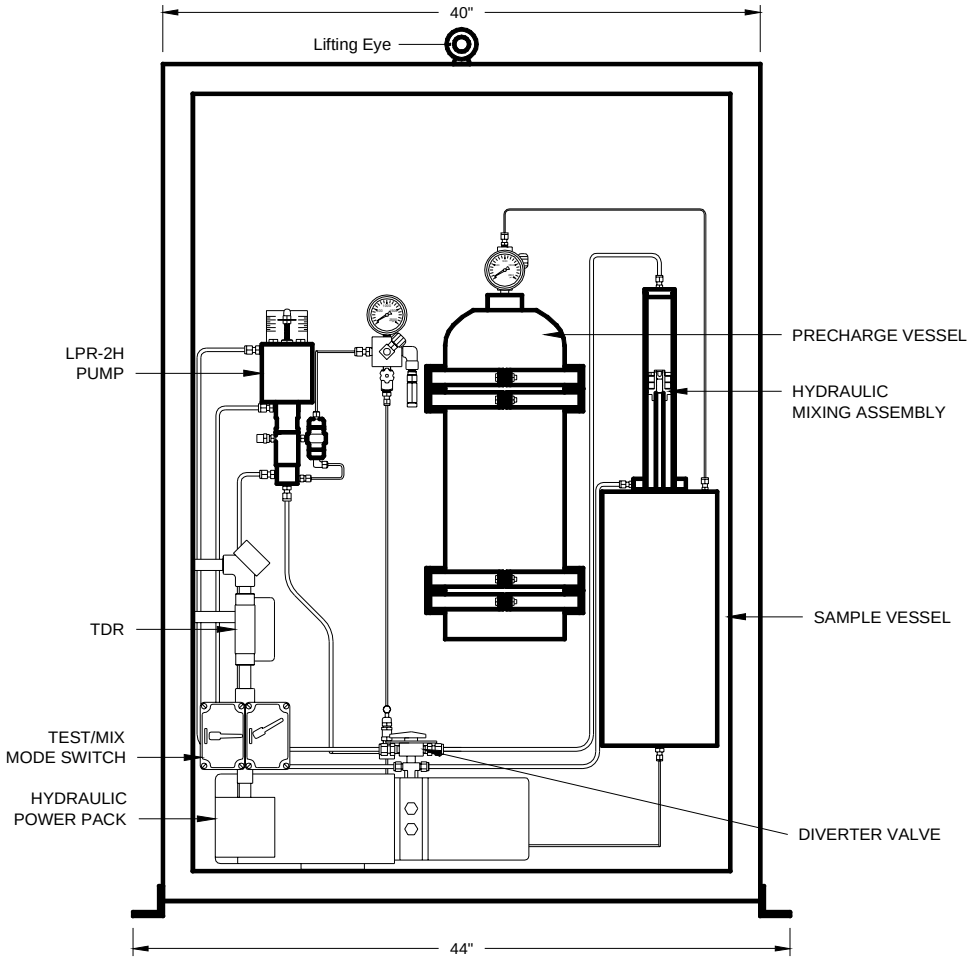
figure 11



SECTION 2: SYSTEM INSTALLATION
Standard Cabinet Mounted Pump (LPR) System Components

figure 12

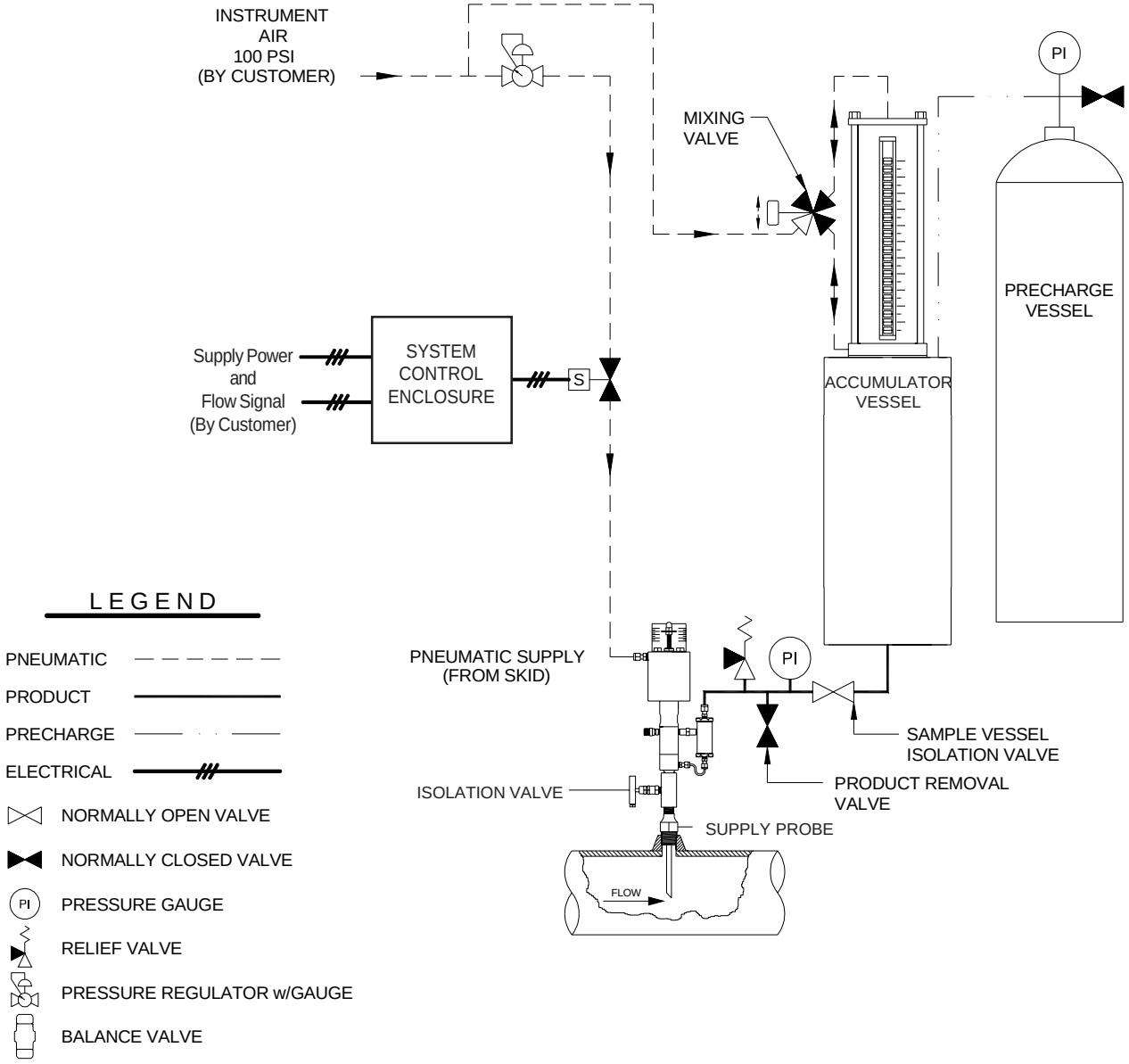
Hydraulic



SECTION 2: SYSTEM INSTALLATION

System Pneumatic Actuated Flow Schematic Probe Mounted (PNR-2P)

figure 13

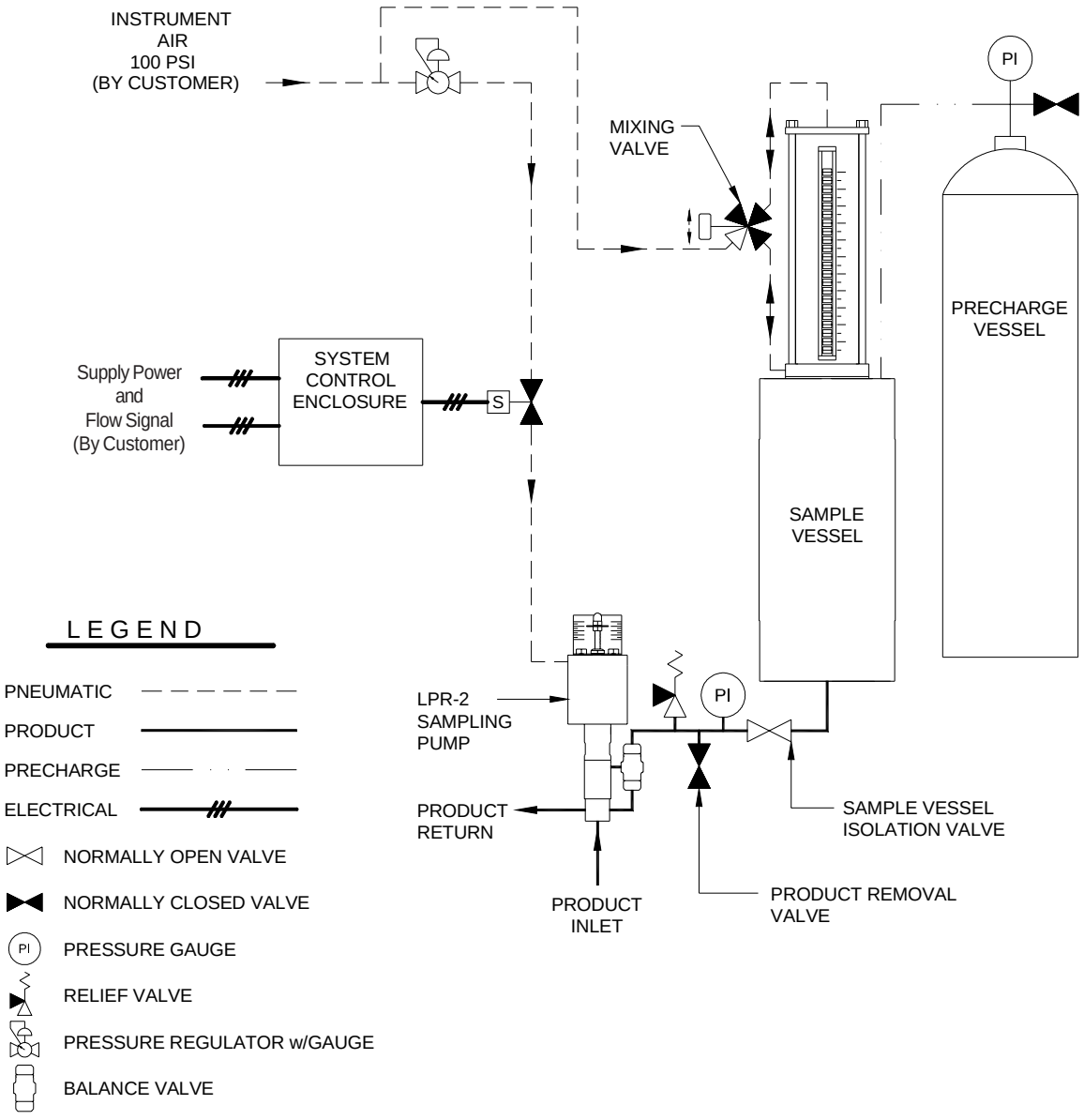


SYSTEM SCHEMATIC

SECTION 2: SYSTEM INSTALLATION

System Pneumatic Actuated Flow Schematic Skid Mounted (LPR-2P)

figure 14

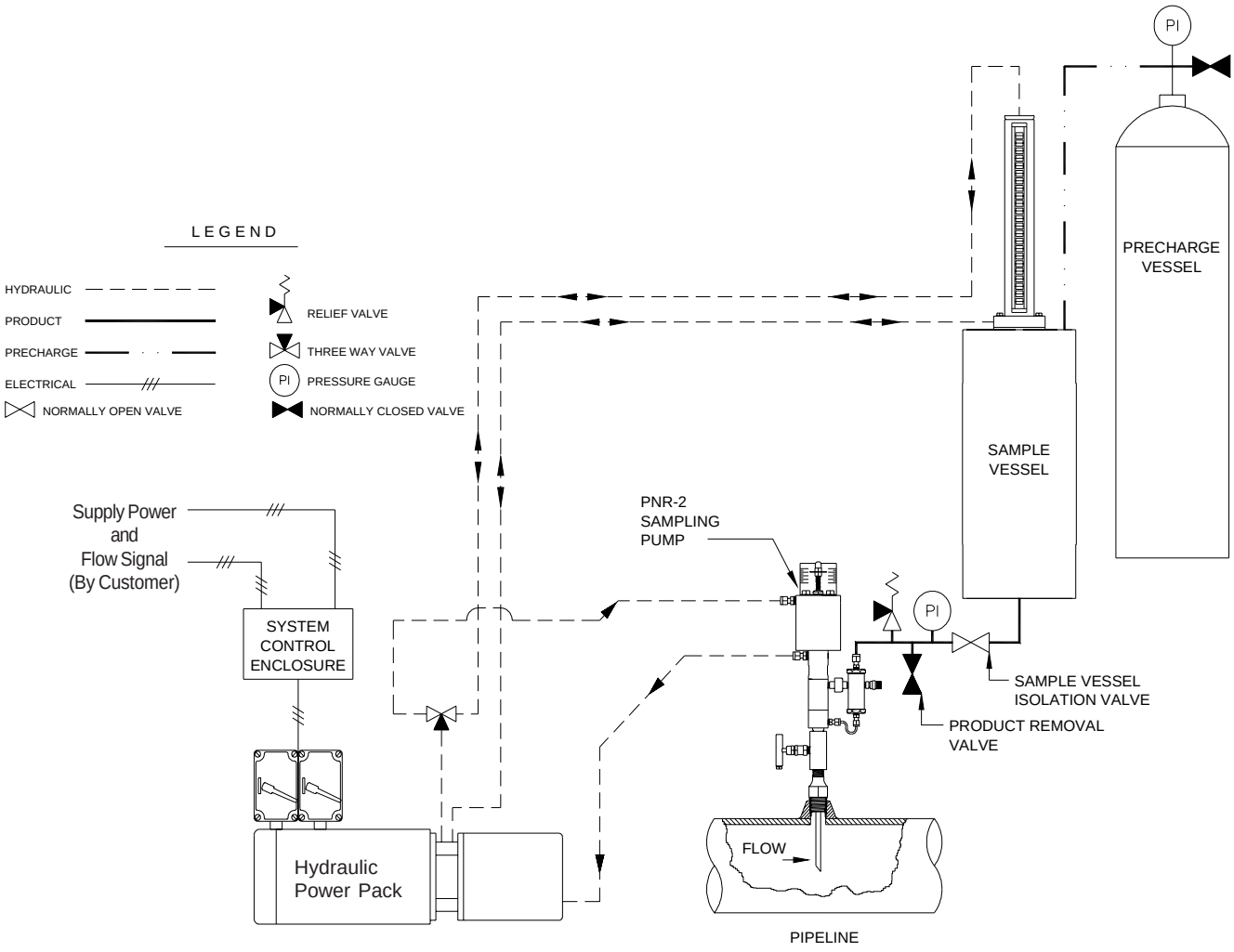


SYSTEM SCHEMATIC

SECTION 2: SYSTEM INSTALLATION

System Hydraulic Actuated Flow Schematic Probe Mounted (PNR-2H)

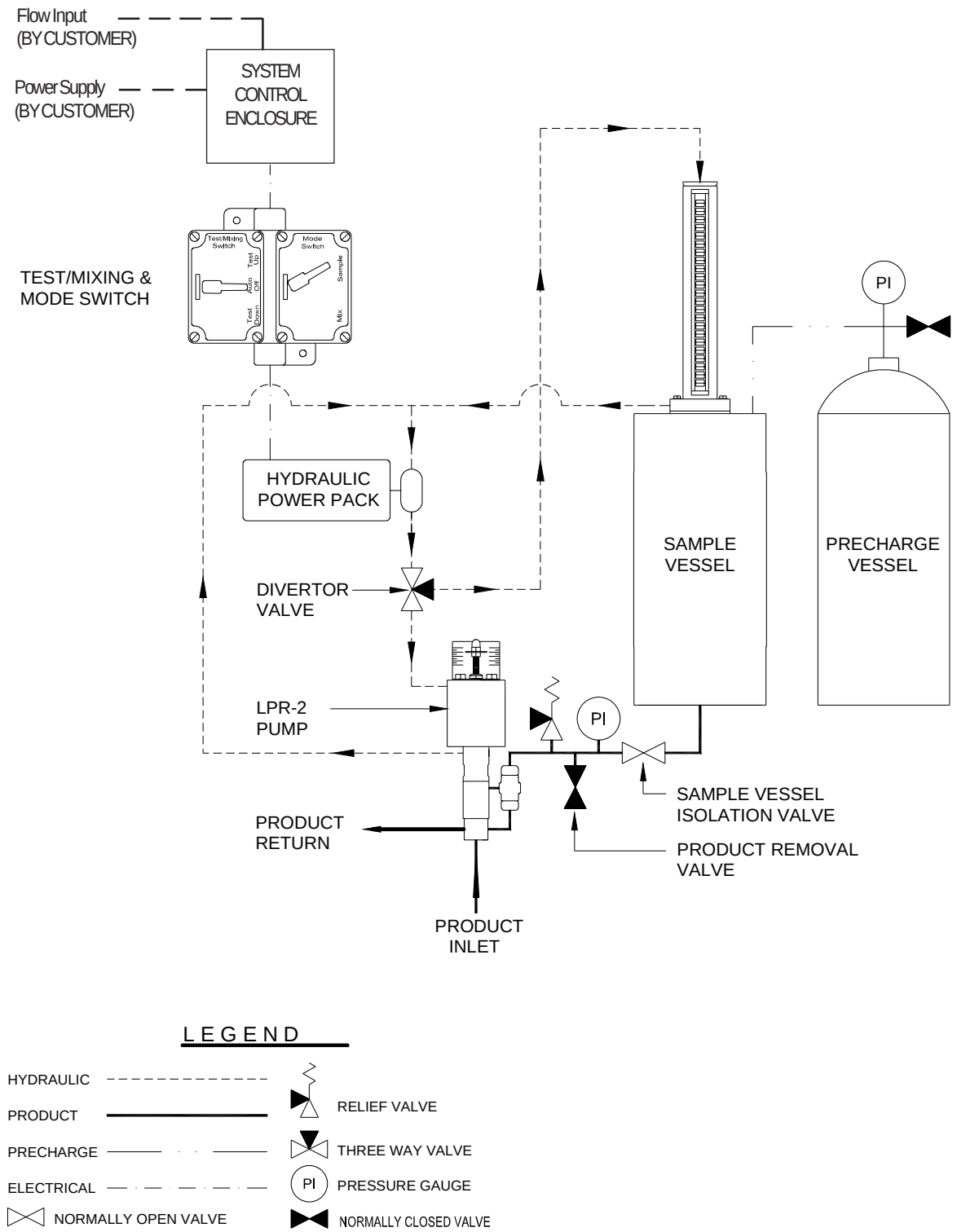
figure 15



SECTION 2: SYSTEM INSTALLATION

System Hydraulic Actuated Flow Schematic Skid/Cabinet Mounted (LPR-2H)

figure 16

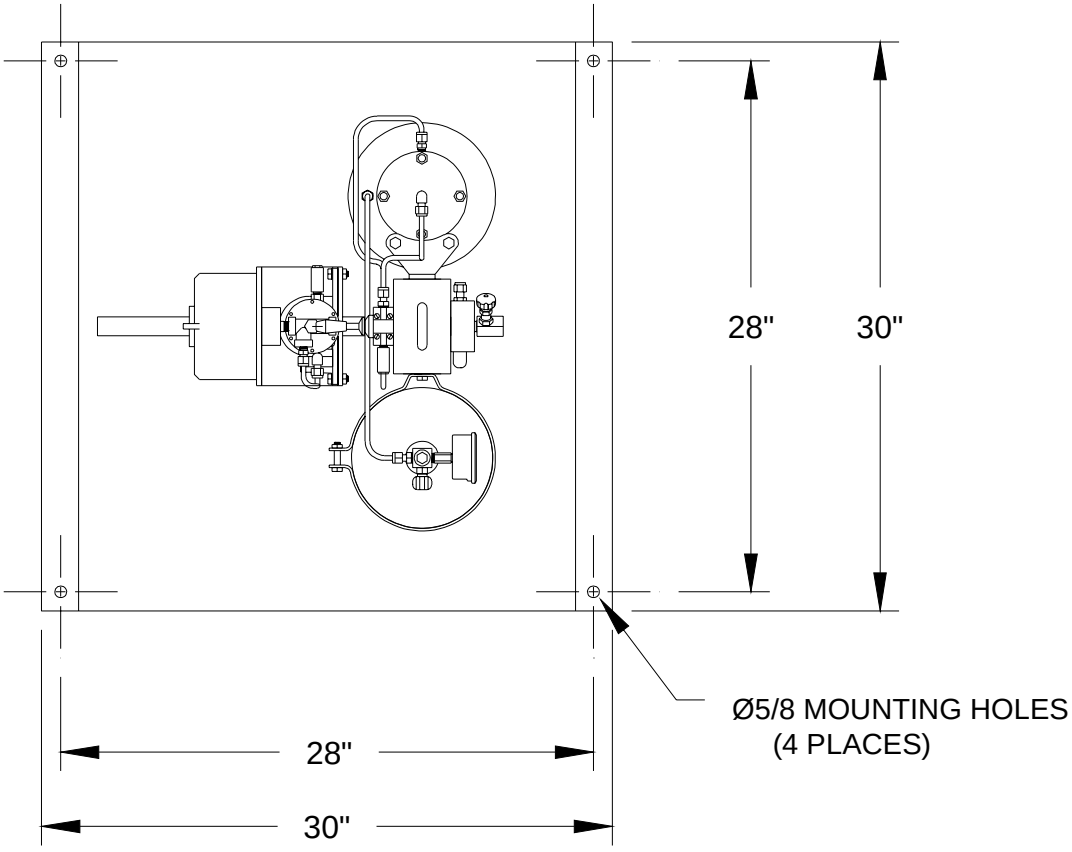


SECTION 2: SYSTEM INSTALLATION
Standard Skid Mounting

1. Bolt down the system skid to a concrete slab using the mounting holes (5/8") provided in the bottom of the skid. Recommended bolt/stud sizes for mounting the skid is 1/2", figure 17.

2. Connect a ground wire from the grounding lug located on the skid to a properly installed ground rod, located adjacent to the system skid, figure 17.

figure 17

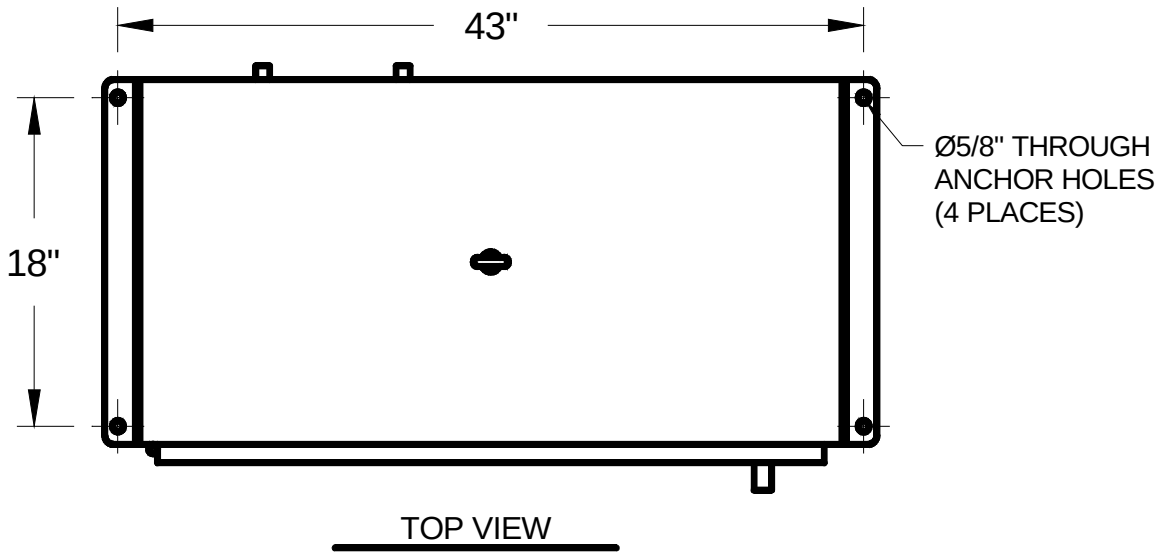


SECTION 2: SYSTEM INSTALLATION
Standard Cabinet Mounting

1. Bolt down the system enclosure to a concrete slab using the mounting holes (5/8") provided in the bottom of each leg of the enclosure. Recommended bolt/stud sizes for mounting the enclosure is 1/2" figure 18.

2. Connect a ground wire from the grounding lug located on the enclosure leg to a properly installed ground rod, located adjacent to the system enclosure, figure 18.

figure 18



SECTION 2: SYSTEM INSTALLATION

Standard Probe Mounted Pneumatic Actuated Skid System (PNR-2S-xP) Connections

Pump Installation

The PNR-2 sample pump is designed to be mounted directly to a threaded connection on the pipeline, *figure 19*. The probe tubing should be cut such that the tip of the probe will be located in the center 1/3 of the pipeline after installation. After the pipeline has been depressurized, the threads on the probe body should be taped and doped and the pump installed into the pipeline connection.

Skid Installation

The skid should be located as close as possible to the pipeline. 1/4" stainless steel tubing should be field routed from the probe mounted Sample Pump/Balance Valve, "product out" connection to the skid mounted 5-Way Cross, port tagged "product in". Likewise, 1/4" stainless steel tubing should be field routed from the pump port tagged "pneumatic supply" back to the Pneumatic Solenoid on the skid. These tubing lines should both incorporate a dielectric isolation fitting between the sample skid and the probe mounted Sample Pump. Care should be taken in routing this tubing to prevent traps, long runs, etc.

CAUTION:

Excessive tubing lengths should be avoided. Installation of the sample system enclosure should be as close to the point of sample removal and the sample pump as possible. If longer tubing lengths are required consult YZ Systems Technical Services at; 800.653.9435 or 1.281.362.6500.

Electrical Connections

A customer supplied power supply must be connected to control the system via the side opening of the skid electrical enclosure labled for it. The wiring for the flow signal should be connected to the control the system via the side opening of the skid electrical enclosure labled for signal in. All electrical connections are typically designed for ½" NPT conduit connections, refer to Section 4, Electrical Wiring for connection details.

figure 19

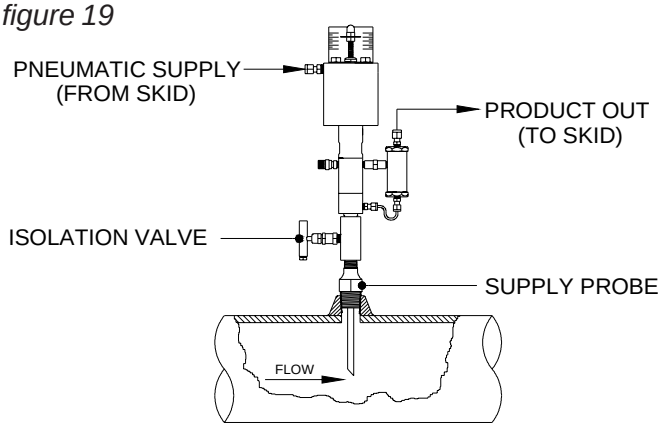


figure 20

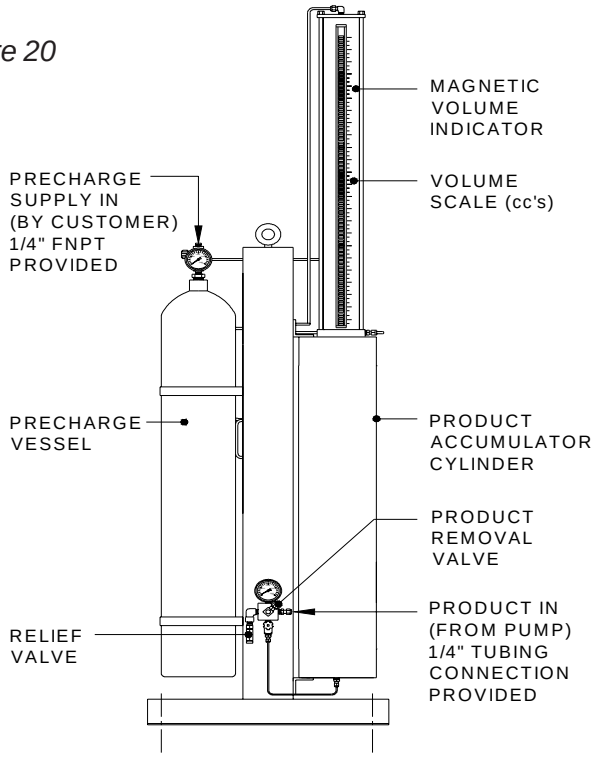
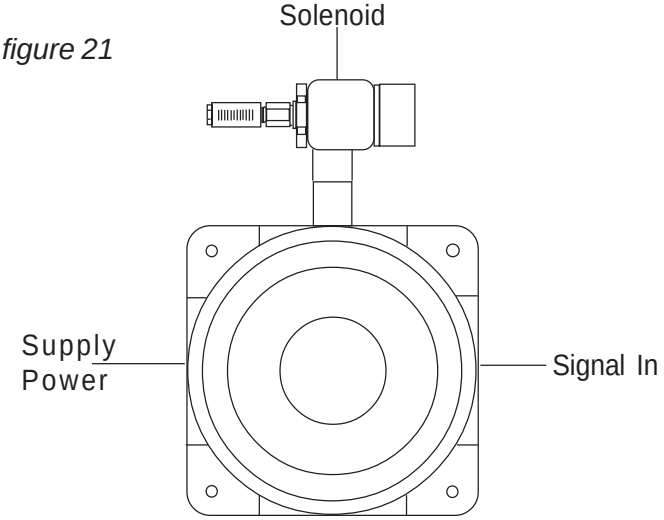


figure 21



SECTION 2: SYSTEM INSTALLATION

Standard Skid Mounted Pneumatic Actuated System (LPR-2S-xP) Connections

Skid Installation

The skid should be located as close as possible to the pipeline. 1/4" stainless steel tubing should be field routed from the pipeline sample probe to the pump Product Loop Supply port tagged “product in”. Likewise, 1/4" stainless steel tubing should be field routed from the pump Product Loop Return port tagged “product loop” back to a downstream port in the pipeline with adequate differential pressure to create a continual flowing sample loop. These tubing lines should both incorporate a dielectric isolation fitting between the sample skid and the pipeline. Care should be taken in routing this tubing to prevent traps, long runs, etc.

CAUTION:

Excessive tubing lengths should be avoided. Installation of the sample system enclosure should be as close to the point of sample removal and the sample pump as possible. If longer tubing lengths are required consult YZ Systems Technical Services at; 800.653.9435 or 1.281.362.6500.

figure 22

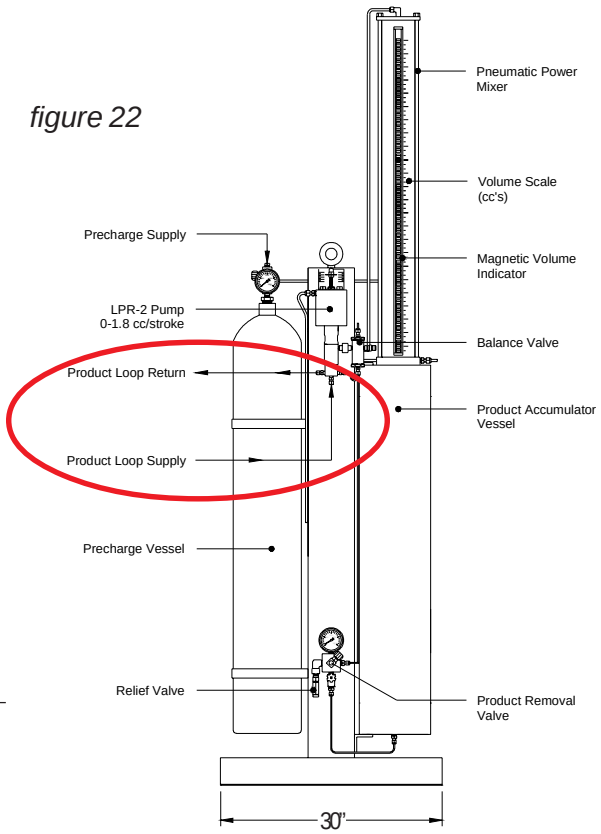
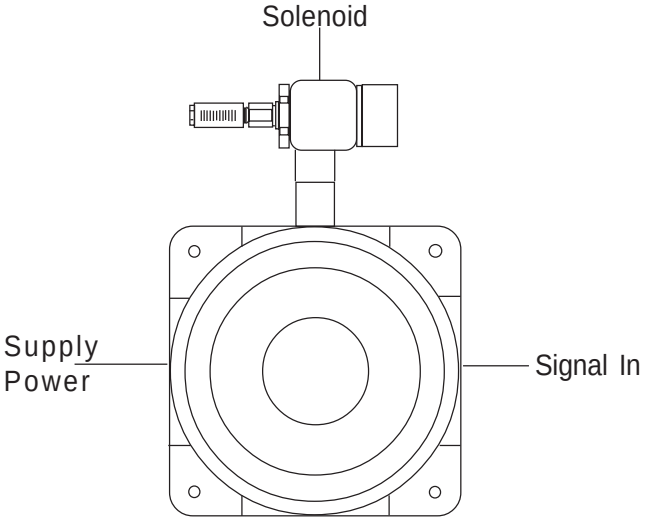


figure 23



Electrical Connections

A customer supplied power supply must be connected to control the system via the side opening of the skid electrical enclosure labled for it. The wiring for the flow signal should be connected to the control the system via the side opening of the skid electrical enclosure labled for signal in. All electrical connections are typically designed for ½” NPT conduit connections, refer to Section 4, Electrical Wiring for connection details.

SECTION 2: SYSTEM INSTALLATION

Standard Probe Mounted Pneumatic Actuated Cabinet System (PNR-2C-xP) Connections

Standard System Connections

Pump Installation

The PNR-2 sample pump is designed to be mounted directly to a threaded connection on the pipeline, *figure 24*. The probe tubing should be cut such that the tip of the probe will be located in the center 1/3 of the pipeline after installation. After the pipeline has been depressurized, the threads on the probe body should be taped and doped and the pump installed into the pipeline connection.

Cabinet Installation

The system enclosure portion of the sampler should be located as close as possible to the sample pump. 1/4" stainless steel tubing should be field routed from the Sample Pump/Balance Valve discharge (product out), *figure 24*, to the Five-Way Cross connection (product in), *figure 25* on the enclosure. Care should be taken in routing tubing to prevent traps, long runs, etc.

1/4" stainless steel tubing should also be field routed from the connection on the Sample Pump labeled pneumatic supply, *figure 24,* to the solenoid valve connection on the system enclosure (pneumatic supply to sample pump), *figure 25*.

CAUTION:

Excessive tubing lengths should be avoided. Installation of the sample system enclosure should be as close to the point of sample removal and the sample pump as possible. If longer tubing lengths are required consult YZ Systems Technical Services at; 800.653.9435 or 1.936.788.5593.

figure 24

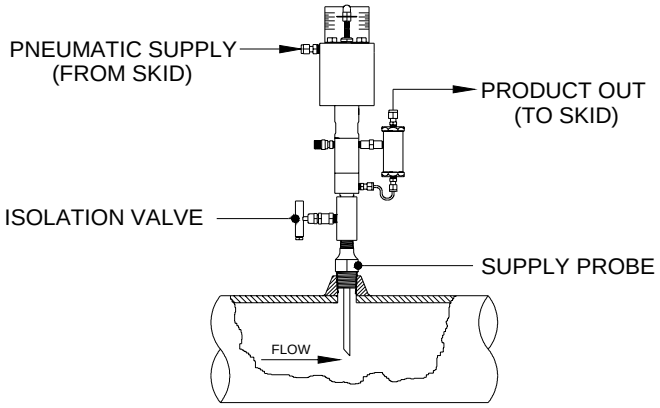
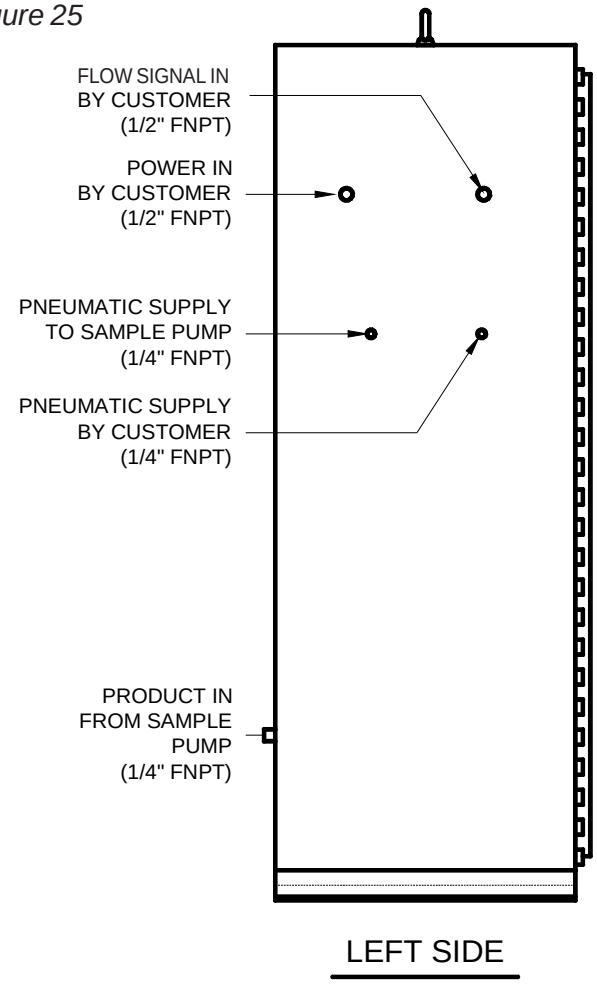


figure 25



SECTION 2: SYSTEM INSTALLATION

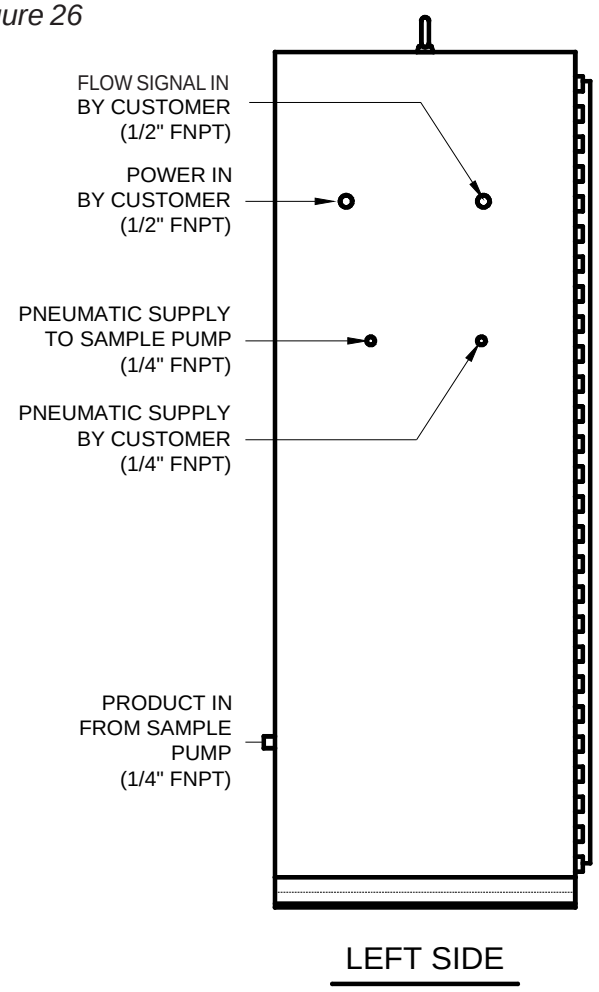
Standard Probe Mounted Pneumatic Actuated Cabinet System (PNR-2C-xP) Connections

Pneumatic Supply
A 1/4" connection is provided on the system enclosure for a continuous pneumatic supply (80-100 psi by customer) to the regulator, *figure 26.* The necessary regulator, solenoid valve, etc. is provided within the sampling system.

Electrical Connections
Power Supply, and the flow signal should be connected to the left side opening for the electrical enclosure *figure 26*.

Pump Sample Size
The sample size of the PNR-2 is adjustable. The sample grab size of the pump is adjusted by loosening the lock/seal nut on top of the pump and turning the volume adjustment screw in to decrease the sample volume or out to increase the sample volume. Once the new sample size has been set, the lock/seal nut should be retightened, refer to Section 2, page 31 .

figure 26

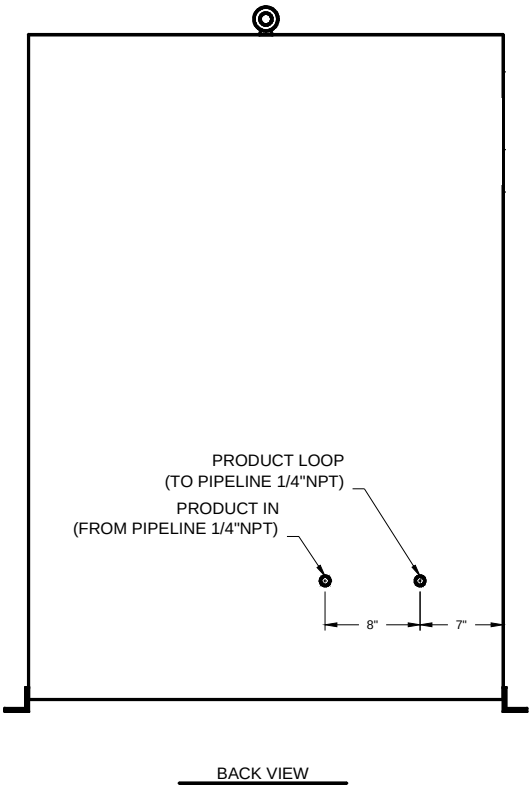


SECTION 2: SYSTEM INSTALLATION

Standard Cabinet Mounted Pneumatic Actuated System (LPR-2C-xP) Connections

Standard System Connections

figure 27



System Installation

The System Enclosure should be located as close as possible to the pipeline. 1/4" stainless steel tubing should be field routed from the pipeline sample probe to the pump port tagged “product in”. Likewise, 1/4" stainless steel tubing should be field routed from the pump port tagged “product loop” back to a downstream port in the pipeline with adequate differential pressure to create a continual flowing sample loop. These tubing lines should both incorporate a dielectric isolation fitting between the sample enclosure and the pipeline. Care should be taken in routing this tubing to prevent traps, long runs, etc.

CAUTION:

Excessive tubing lengths should be avoided. Installation of the sample system enclosure should be as close to the point of sample removal and the sample pump as possible. If longer tubing lengths are required consult YZ Systems Technical Services at; 800.653.9435 or 1.281.362.6500.

Electrical Connections

Power Supply, and the flow signal should be connected to the left side opening for the electrical enclosure.

SECTION 2: SYSTEM INSTALLATION

Standard Probe Mounted Hydraulic Actuated Skid System (PNR-2S-xH) Connections

Pump Installation

The PNR-2 sample pump is designed to be mounted directly to a threaded connection on the pipeline, *figure 28*. The probe tubing should be cut such that the tip of the probe will be located in the center 1/3 of the pipeline after installation. After the pipeline has been depressurized, the threads on the probe body should be taped and doped and the pump installed into the pipeline connection.

System Skid Installation

The system skid portion of the sampler should be located as close as possible to the sample pump. 1/4" stainless steel tubing should be field routed from the Sample Pump discharge check (product out), *figure 28*, to the Five-Way Cross connection (product in), *figure 29 (front)* on the Skid. Care should be taken in routing tubing to prevent traps, long runs, etc.

1/4" - 3/8" stainless steel tubing should also be field routed from the connection on the Sample Pump labeled hydraulic supply (from skid), *figure 28,* to the hydraulic supply to pump connection on the system Skid, *figure 30 (rear)*. Additionally 1/4" - 3/8" stainless steel tubing should also be field routed from the connection on the Sample Pump labeled hydraulic return (from skid), *figure 28,* to the hydraulic return from pump connection on the system skid, *figure 30 (rear)*.
See also Appendix A, Hydraulic Power Pack, page 100.

CAUTION:

Excessive tubing lengths should be avoided. Installation of the sample system Skid should be as close to the point of sample removal and the sample pump as possible. If longer tubing lengths are required consult YZ Systems Technical Services at; 800.653.9435 or 1.281.362.6500.

figure 28

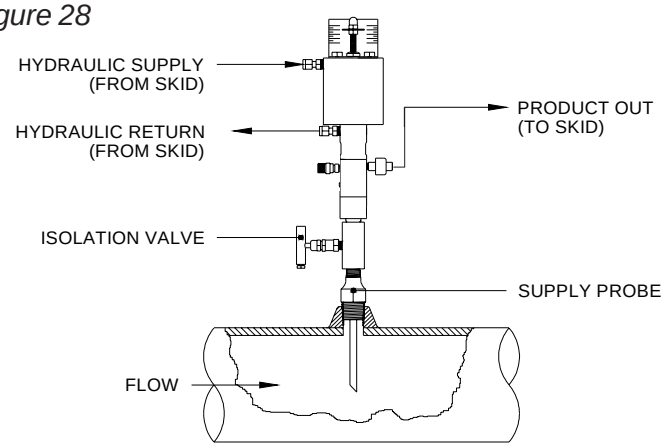


figure 29 (front)

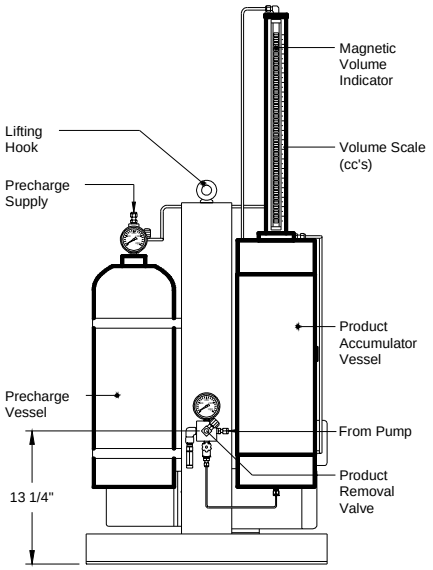
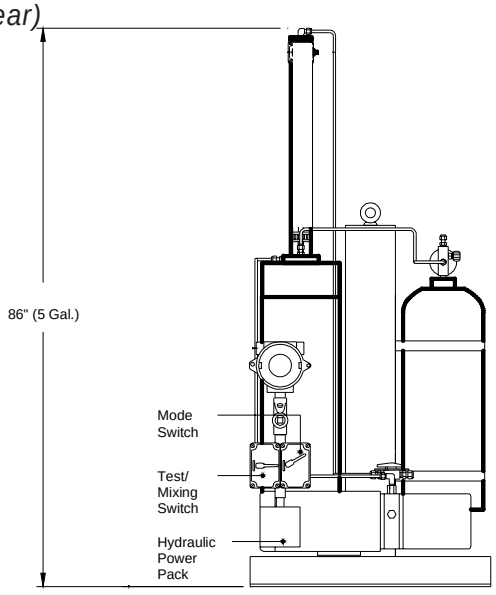


figure 30 (rear)



SECTION 2: SYSTEM INSTALLATION

Standard Probe Mounted Hydraulic Actuated Skid System (PNR-2S-xH) Connections

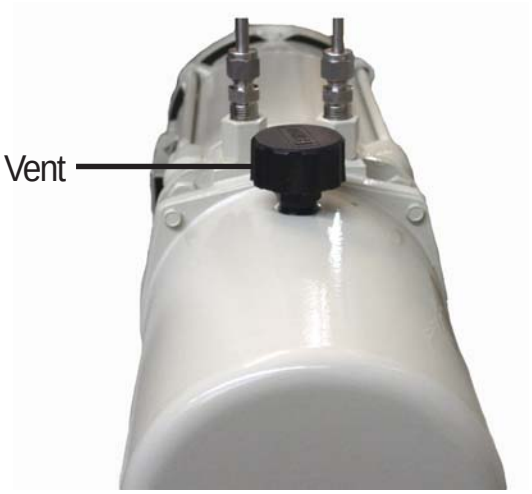
Electrical Connections
120 VAC, 60 Hz electrical power, and the flow signal should be connected to the left side opening for the electrical Skid *figure 30 (rear)*.

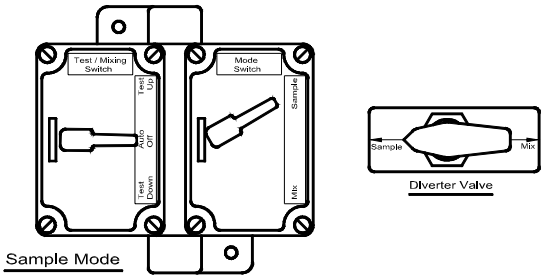
Pump Sample Size
The sample size of the PNR-2 is adjustable. The sample grab size of the pump is adjusted by loosening the lock/seal nut on top of the pump and turning the volume adjustment screw in to decrease the sample volume or out to increase the sample volume. Once the new sample size has been set, the lock/seal nut should be retightened, refer to Section 2, page 31 .

Hydraulic Power Pack Breather
Remove the 3/8" NPT plug located in the top of the power pack reservoir. Install the breather provided with the skid.

Hydraulic Pump Line Purging
During this process, check the fluid level in the hydraulic oil reservoir frequently to assure that you do not run low on fluid. Slightly loosen the return connection tubing connection on the System Skid. When the Hydraulic Power Pack is actuated in this mode air will escape at this connection. Verify that the electrical Mode Switch is in the **Mix Mode**, and the manual Diverter Valve is set to **Sample**. Now use the electrical Test Switch to actuate the Hydraulic Power Pack. Hold in the **Test** position until you get hydraulic fluid at the hydraulic return connection. As soon as you get fluid at this connection, release the Test switch, and tighten the connection.

figure 31

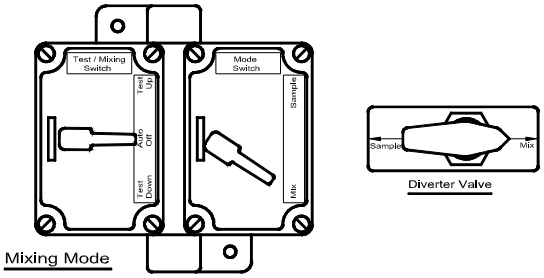




Sample Mode

In the SAMPLE MODE, the Diverter Valve should be in the SAMPLE position. Likewise, the mode switch should be in the SAMPLE position. This will enable the Test / Mixing switch to be used as a test switch to verify proper operation of the sample pump.

To verify the operation of the sample pump, move the Test / Mixing switch either up or down to test position and release.



Mixing Mode

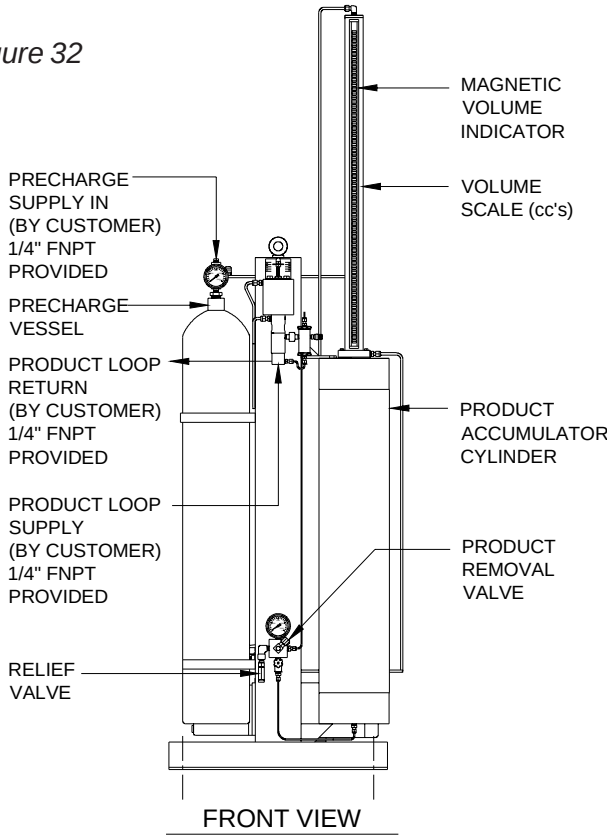
In the MIXING MODE, the Diverter Valve should be in the MIX position. Likewise, the mode switch should be in the MIX position. This will enable the Test / Mixing switch to be used as a mixing switch. In this position, the mixing rod and disc can be moved up and down through the product stored in the sample vessel to insure a homogeneous mixture.

To mix product, move the Test / Mixing switch to the UP position. this will move the mixing disc up. Move the Test / Mixing switch to the DOWN position to move the mixing disc down.

SECTION 2: SYSTEM INSTALLATION

Standard Skid Mounted Hydraulic Actuated System (LPR-2S-xH) Connections

figure 32



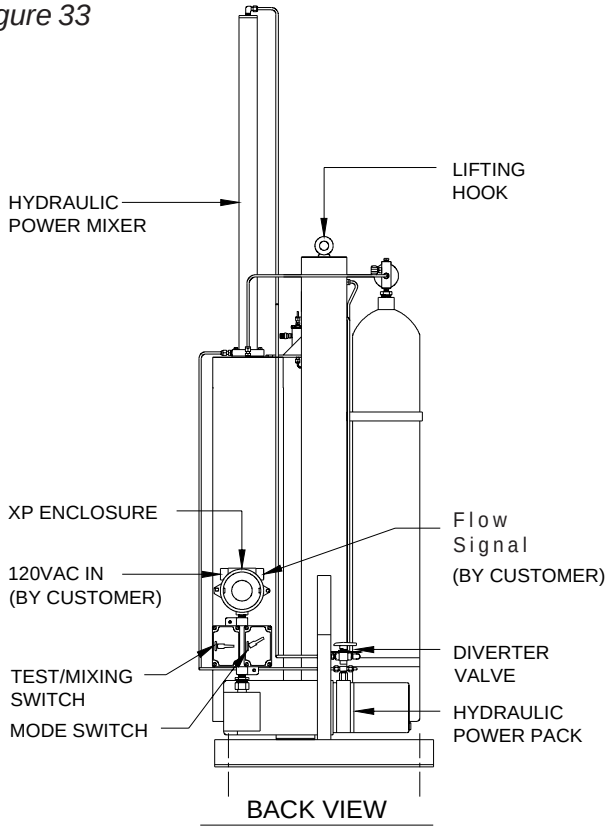
Skid Installation

The skid should be located as close as possible to the pipeline. 1/4" stainless steel tubing should also be field routed from the pipeline sample probe to the pump port tagged “product in”, or product loop supply. Likewise, 1/4" stainless steel tubing should be field routed from the pump port tagged “product loop” return back to a downstream port in the pipeline with adequate differential pressure to create a continual flowing sample loop. Care should be taken in routing this tubing to prevent traps, long runs, etc.

CAUTION:

Excessive tubing lengths should be avoided. Installation of the sample system enclosure should be as close to the point of sample removal and the sample pump as possible. If longer tubing lengths are required consult YZ Systems Technical Services at; 800.653.9435 or 1.281.362.6500.

figure 33



Electrical Connections

120 VAC, 60 Hz, electrical power should be connected to the left side opening of the skid electrical enclosure. The power wiring should be connected to the wires tagged “120 VAC”. The hot wire should be connected to the black system wire. The neutral wire should be connected to the white system wire.

The flow signal to control the system should be connected to the right side opening of the skid electrical enclosure. The wiring for the flow signal should be connected to the wires which are tagged for that purpose, refer to Section 4, Electrical Wiring.

SECTION 2: SYSTEM INSTALLATION

Standard Skid Mounted Hydraulic Actuated System (LPR-2S-xH) Connections

Pump Sample Size

The sample size of the PNR-2 is adjustable. The sample grab size of the pump is adjusted by loosening the lock/seal nut on top of the pump and turning the volume adjustment screw in to decrease the sample volume or out to increase the sample volume. Once the new sample size has been set, the lock/seal nut should be retightened, refer to Section 2, page 31 .

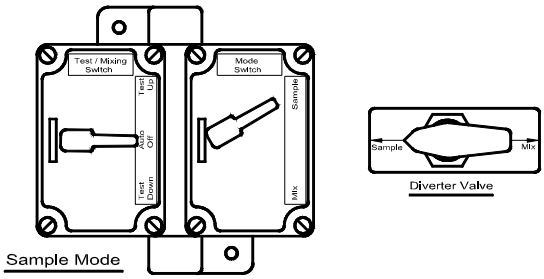
figure 34

Hydraulic Power Pack Breather

Remove the 3/8" NPT plug located in the top of the power pack reservoir. Install the breather provided with the skid.

Hydraulic Pump Line Purging

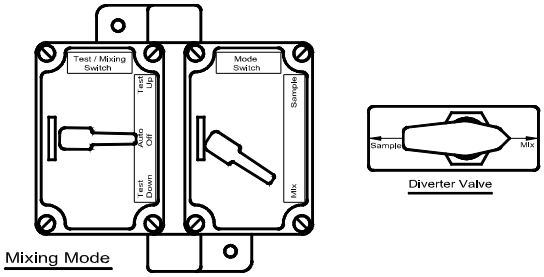
During this process, check the fluid level in the hydraulic oil reservoir frequently to assure that you do not run low on fluid. Slightly loosen the return connection tubing connection on the System Skid. When the Hydraulic Power Pack is actuated in this mode air will escape at this connection. Verify that the electrical Mode Switch is in the **Mix Mode**, and the manual Diverter Valve is set to **Sample**. Now use the electrical Test Switch to actuate the Hydraulic Power Pack. Hold in the **Test** position until you get hydraulic fluid at the hydraulic return connection. As soon as you get fluid at this connection, release the Test switch, and tighten the connection.



Sample Mode

In the SAMPLE MODE, the Diverter Valve should be in the SAMPLE position. Likewise, the mode switch should be in the SAMPLE position. This will enable the Test / Mixing switch to be used as a test switch to verify proper operation of the sample pump.

To verify the operation of the sample pump, move the Test / Mixing switch either up or down to test position and release.



Mixing Mode

In the MIXING MODE, the Diverter Valve should be in the MIX position. Likewise, the mode switch should be in the MIX position. This will enable the Test / Mixing switch to be used as a mixing switch. In this position, the mixing rod and disc can be moved up and down through the product stored in the sample vessel to insure a homogeneous mixture.

To mix product, move the Test / Mixing switch to the UP position. this will move the mixing disc up. Move the Test / Mixing switch to the DOWN position to move the mixing disc down.

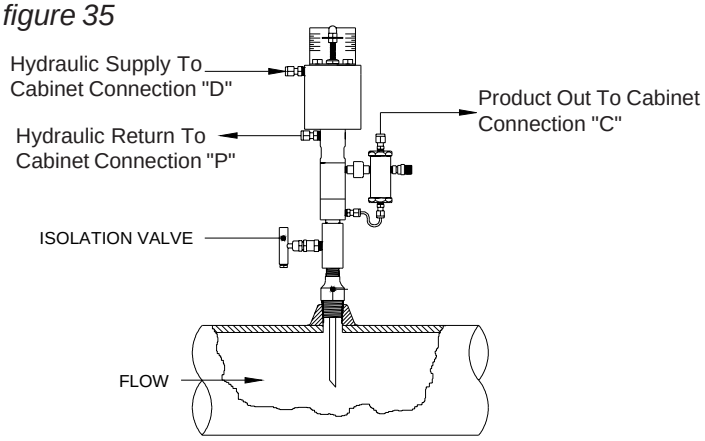
SECTION 2: SYSTEM INSTALLATION

Standard Probe Mounted Hydraulic Actuated Cabinet System (PNR-2C-xH) Connections

Pump Installation

The PNR-2 sample pump is designed to be mounted directly to a threaded connection on the pipeline. The probe tubing should be cut such that the tip of the probe will be located in the center 1/3 of the pipeline after installation. After the pipeline has been depressurized, the threads on the probe body should be taped and doped and the pump installed into the pipeline connection.

figure 35



Electrical Connections

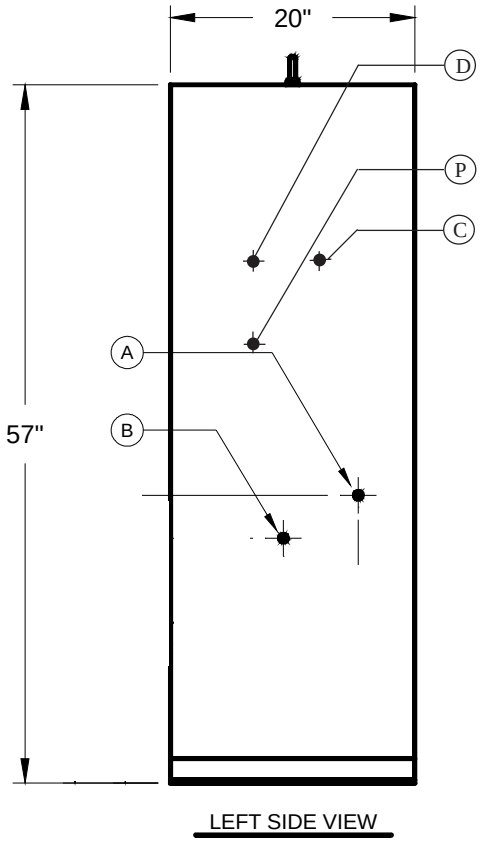
120 VAC, 60 Hz electrical power should be connected to the left side opening of the cabinet electrical enclosure. The power wiring should be connected to the wires tagged “120 Volt AC”. The hot wire should be connected to the black system wire. The neutral wire should be connected to the white system wire. The flow signal should be connected at this time

Cabinet Installation

The cabinet should be located as close as possible to the pipeline. Care should be taken in routing tubing between the pump and cabinet, to prevent traps, long runs, etc. 1/4" stainless steel tubing should be field routed from the balance valve discharge to the product in connection for the five-way cross.

1/4" - 3/8” stainless steel tubing should also be field routed from the sample pump hydraulic supply and return ports to the cabinet connections. These lines will have to be purged of air, and filled with hydraulic fluid before and pump actuation can begin.

figure 36



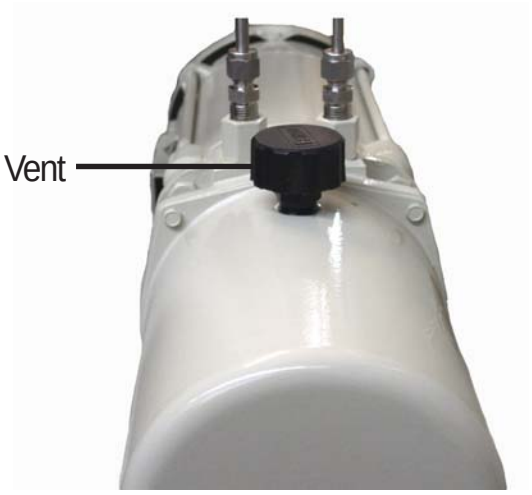
SECTION 2: SYSTEM INSTALLATION

Standard Probe Mounted Hydraulic Actuated Cabinet System (PNR-2C-xH) Connections

Precharge Gas Installation

Connect the precharge gas source (normally nitrogen) to the isolation valve 1/4" NPT connection located on top of the precharge vessel. Open the isolation valve. Fill the precharge vessel with gas until the pressure in the vessel is 100 to 150 psi above the vapor pressure of the product to be sampled. Once the vessel is filled, close the isolation valve and remove the precharge gas source. Leak test all connections between the precharge vessel and the product accumulator vessel.

figure 37

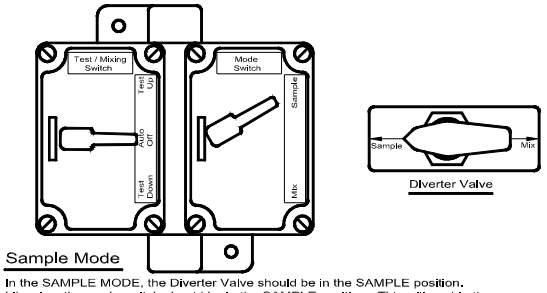


Hydraulic Power Pack Breather

Remove the 1/4" NPT plug located in the top of the power pack reservoir. Install the breather provided with the skid.

Hydraulic Pump Line Purging

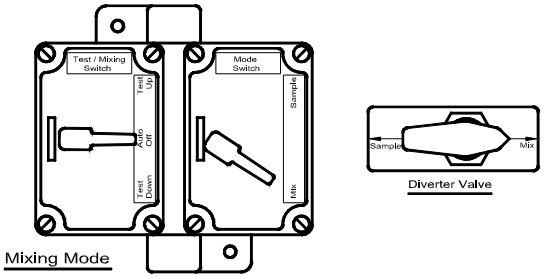
Durring this process, check the fluid level in the hydraulic oil reservoir frequently to assure that you do not run low on fluid. Slightly loosen the tubing connection "P" on the side of the cabinet. When the Hydraulic Power Pack is actuated in this mode air will escape at this connection. Verify that the
electrical Mode Switch, and the manual Diverter Valve are both set to Sample. Now use the electrical Test Switch to actuate the Hydraulic Power Pack. Hold in the Test position until you get hydraulic fluid at connection "P" on the cabinet. As soon as you get fluid at connection "P" on the cabinet, tighten the connection, and relaese the Test switch.



Sample Mode

In the SAMPLE MODE, the Diverter Valve should be in the SAMPLE position. Likewise, the mode switch should be in the SAMPLE position. This will enable the Test / Mixing switch to be used as a test switch to verify proper operation of the sample pump.

To verify the operation of the sample pump, move the Test / Mixing switch either up or down to test position and release.



Mixing Mode

In the MIXING MODE, the Diverter Valve should be in the MIX position. Likewise, the mode switch should be in the MIX position. This will enable the Test / Mixing switch to be used as a mixing switch. In this position, the mixing rod and disc can be moved up and down through the product stored in the sample vessel to insure a homogeneous mixture.

To mix product, move the Test / Mixing switch to the UP position. this will move the mixing disc up. Move the Test / Mixing switch to the DOWN position to move the mixing disc down.

SECTION 2: SYSTEM INSTALLATION

Standard Cabinet Mounted Hydraulic Actuated System (LPR-2C-xH) Connections

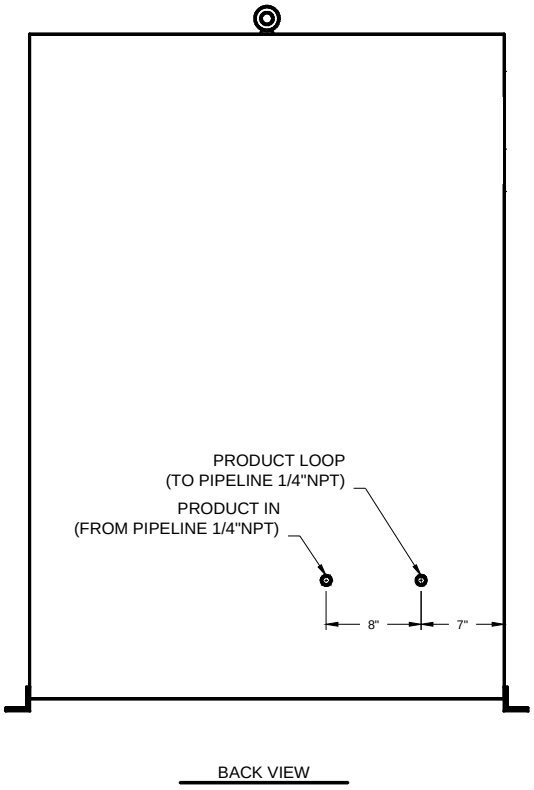
Sample Probe Installation

The sample probe assembly is designed to be mounted directly to a threaded connection on the pipeline. The probe should be cut such that the tip of the probe will be located in the center 1/3 of the pipeline after installation. After the pipeline has been depressurized, the threads on the probe body should be taped and doped and the pump installed into the pipeline connection. Location of the probe in the pipeline should be in accordance with approved sampling standards. It is essential that the probe be located in an area of the pipeline where the product will be homogeneously mixed. The probe should be inserted to extract the product from the center 1/3 of the pipeline. It should then be connected to the Sample Pump product connection and return ports in a manner to assure adequate flow through the connection lines.

Cabinet Installation

The cabinet should be located as close as possible to the pipeline. 1/4" stainless steel tubing should also be field routed from the sample probe discharge to the port tagged "product in" on the enclosure, which connects to the product inlet of the Sample Pump. 1/4" stainless steel tubing should also be field routed from the return connection on the cabinet to the low pressure return port of the pipeline. Care should be taken in routing this tubing to prevent traps, long runs, etc.

figure 38



SECTION 2: SYSTEM INSTALLATION

Standard Cabinet Mounted Hydraulic Actuated System (LPR-2C-xH) Connections

Electrical Connections

120 VAC, 60 Hz electrical power, and the flow signal should be connected to the left side opening for the electrical Skid *figure 26 (rear)*.

Pump Sample Size

The sample size of the PNR-2 is adjustable. The sample grab size of the pump is adjusted by loosening the lock/seal nut on top of the pump and turning the volume adjustment screw in to decrease the sample volume or out to increase the sample volume. Once the new sample size has been set, the lock/seal nut should be retightened, refer to Section 2, page 31 .

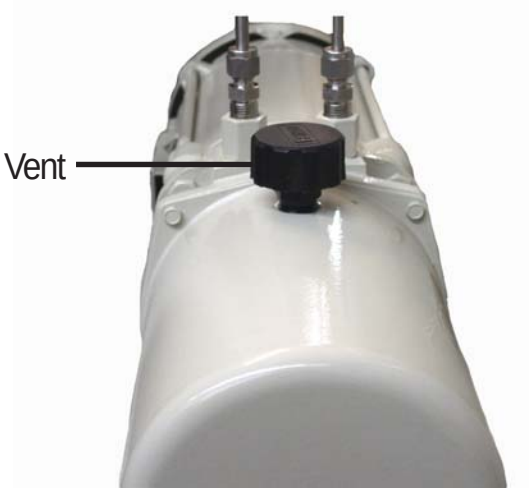
Hydraulic Power Pack Breather

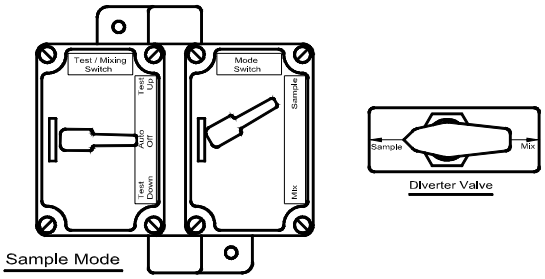
Remove the 3/8" NPT plug located in the top of the power pack reservoir. Install the breather provided with the skid.

Hydraulic Pump Line Purging

During this process, check the fluid level in the hydraulic oil reservoir frequently to assure that you do not run low on fluid. Slightly loosen the return connection tubing connection on the System Skid. When the Hydraulic Power Pack is actuated in this mode air will escape at this connection. Verify that the electrical Mode Switch is in the **Mix Mode**, and the manual Diverter Valve is set to **Sample**. Now use the electrical Test Switch to actuate the Hydraulic Power Pack. Hold in the **Test** position until you get hydraulic fluid at the hydraulic return connection. As soon as you get fluid at this connection, release the Test switch, and tighten the connection.

figure 39

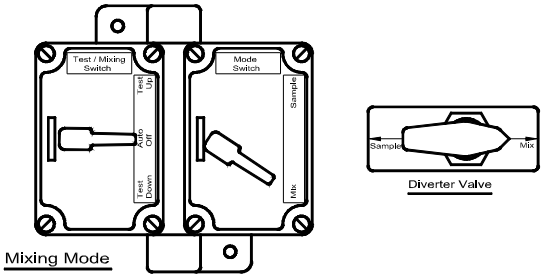




Sample Mode

In the SAMPLE MODE, the Diverter Valve should be in the SAMPLE position. Likewise, the mode switch should be in the SAMPLE position. This will enable the Test / Mixing switch to be used as a test switch to verify proper operation of the sample pump.

To verify the operation of the sample pump, move the Test / Mixing switch either up or down to test position and release.



Mixing Mode

In the MIXING MODE, the Diverter Valve should be in the MIX position. Likewise, the mode switch should be in the MIX position. This will enable the Test / Mixing switch to be used as a mixing switch. In this position, the mixing rod and disc can be moved up and down through the product stored in the sample vessel to insure a homogeneous mixture.

To mix product, move the Test / Mixing switch to the UP position. this will move the mixing disc up. Move the Test / Mixing switch to the DOWN position to move the mixing disc down.

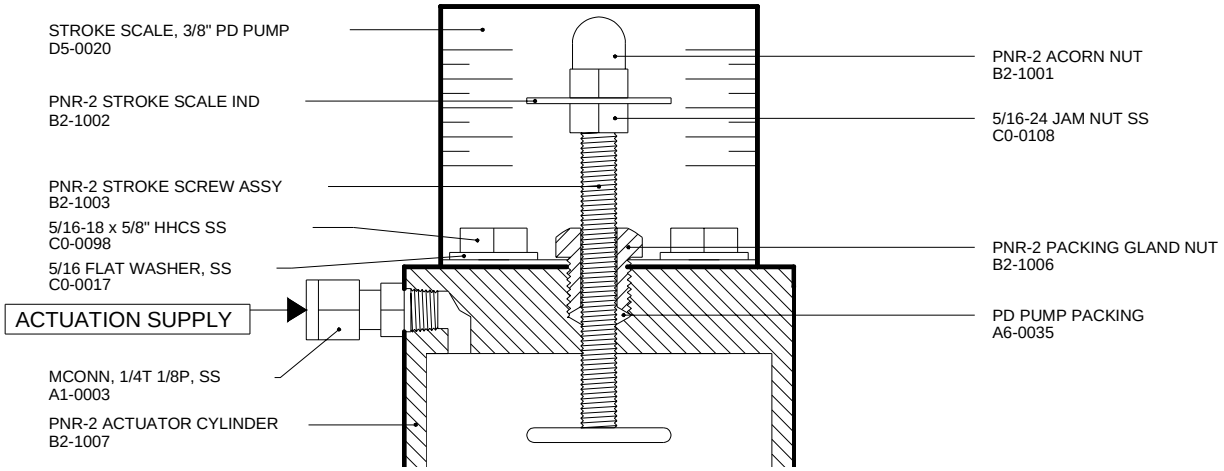
Pump Sample Size

The sample size of the PNR-2 Pump is adjustable. Sample grab size of the pump is adjusted by loosening the 5/16 jam nut on top of the pump and turning the volume adjustment screw acorn nut in to decrease the sample volume or out to increase the sample volume. Once the new sample size has been set, the jam nut should be retightened, refer to Section 6, pages 63-66, and Appendix, pages 87-90 .

Pump Displacement:

Std. 3/8" Plunger	.25 - 1.8 cc/Stroke
Opt.1/2" Plunger	0.8 - 3.2 cc/Stroke
Opt.5/8" Plunger	1.25 - 5.0cc/Stroke
Opt.1" Plunger	1.6 - 12.8cc/StrokeThe

figure 40



Notes

SECTION 3: FILLING THE PRE-CHARGE VESSEL

The purpose of the precharge system is to keep the sampled product in a liquid phase. This is accomplished by maintaining a precharge pressure on top of the accumulator vessel piston. The precharge vessel provides additional volume to the precharge system, which minimizes the pressure increase within the product accumulator as it fills.

Prior to placing the sampler into service, it is necessary that the precharge system be charged to a pressure at least 100 psi greater than the product vapor pressure. For example, if a product with a vapor pressure of 300 psi is being sampled, a precharge pressure of 400 psi would be required. Servicing the precharge vessel is done using the isolation valve located on top of the precharge vessel. Please note that the valve isolates the precharge system from the atmosphere, and does not separate the precharge vessel from the accumulator vessel. Also, the precharge vessel is shipped with 10 psi of blanket pressure. Normally this Pre-Charge vessel should only need to be filled one time at the installation of the sampler system, as the gas is not consumed in the sampling process.

CAUTION:

Take necessary precautions when working with Nitrogen Vessels, as the high pressure contained within is dangerous Additionally, all personnel should wear protective clothing, and use equipment as recommended by the manufacturer during this time. If you are uncertain about any aspect of the Nitrogen Vessel itself, you should contact the manufacturer of your Vessel prior to proceeding.

Filling the Vessel

1. Connect the precharge gas source (normally nitrogen) to the isolation valve 1/4" NPT connection located on top of the precharge vessel, *refer to page 93*.

2. Open the isolation valve.

3. Fill the precharge vessel with gas until the pressure in the vessel is 100 to 150 psi above the vapor pressure of the product to be sampled.

4. Once the vessel is filled, close the isolation valve and remove the precharge gas source.

5. Leak test all connections between the precharge vessel and the product accumulator vessel.

6. Continue through the remaining procedures in this manual.

SECTION 3: FILLING THE PRE-CHARGE VESSEL

Notes

SECTION 4: SYSTEM CONTROL & ELECTRONICS

Overview

The electronic control package provided with your sampling system may consist of a simple solenoid which interfaces with an outside control system to operate, or it may be a self contained controller, or anything in between. The control system must send a mimimum 3 second actuation pulse to the sample pump. This 3 second duration allows sufficient time to stroke the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

All electronics are housed in explosion proof enclosures and are rated for use in Class I, Division 1, Groups C and D hazardous locations, or are Intrinsically Safe for installation in Class I, Division 1, Groups C and D hazardous locations.

By properly adjusting both the sample size and the sample frequency, the sample vessel will fill to 80% capacity at the end of the sample period.

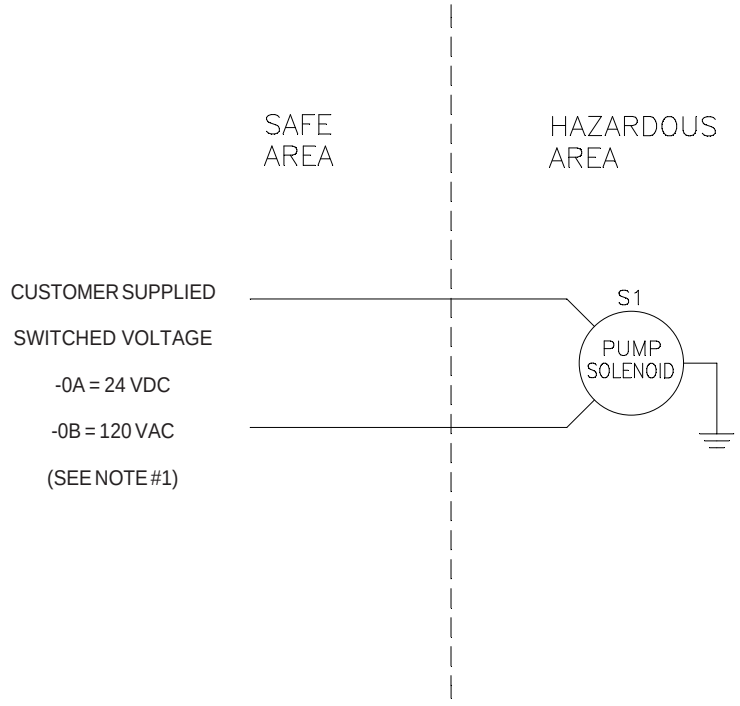
Refer to apropriate control option wiring information on the following pages, and to Section 5 for Programming for Operation details.

Pneumatic Actuated "- 0" Control Option

The electronic control package provided this sampling system consist of a simple solenoid which interfaces with an outside customer supplied power supply and control system to operate it. The control system must send a mimimum 3 second actuation pulse to the solenoid. This 3 second duration allows sufficient time for the solenoid to actuate the sample pump and retrieve a single sample.

Proper programing of the customer supplied control unit should allow the sample vessel to fill to 80% capacity at the end of the sample period.

figure 41



NOTES

1. VOLTAGE SIGNAL MUST HAVE A MINIMUM DWELL OF 3 SECONDS.

SECTION 4: SYSTEM CONTROL & ELECTRONICS

Pneumatic Actuated "- 1A" (24 VDC) Control Option

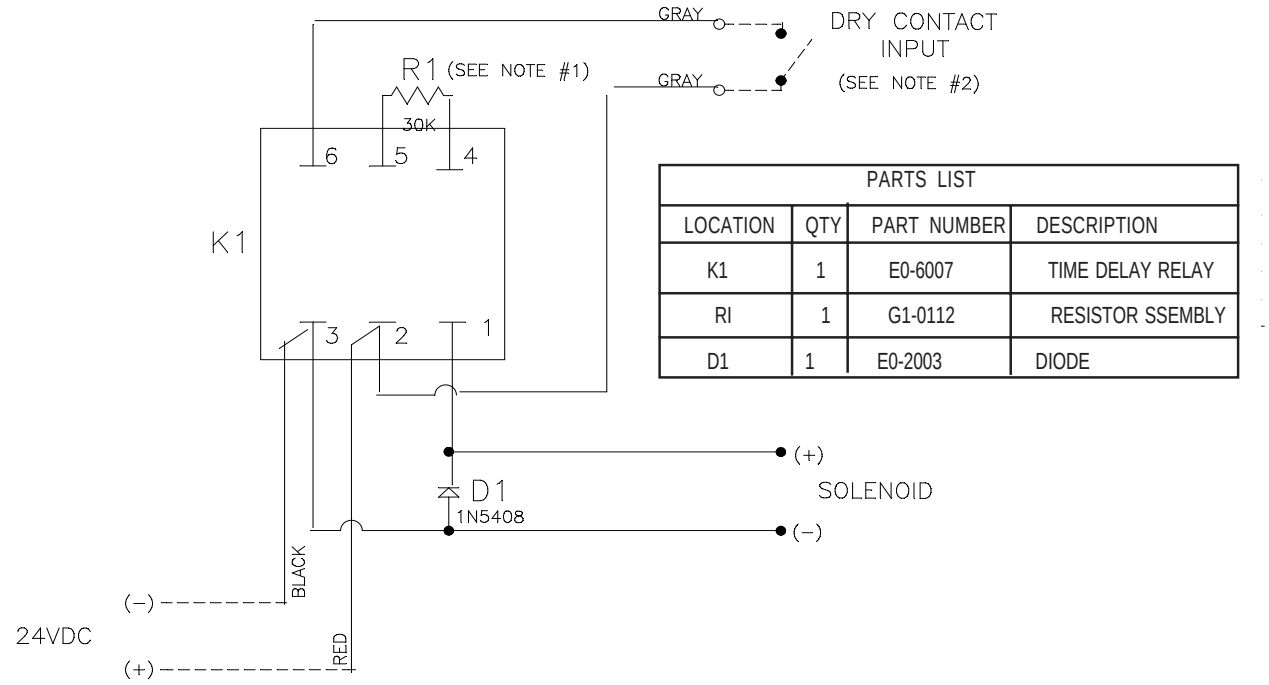
The electronic control package provided with this sampling system consists of a solid state Time Delay Relay (TDR), and a solenoid. The TDR converts a continuous voltage signal into a 3 second voltage output to the solenoid, everytime a contact closure occurs. This 3 second duration allows sufficient time to actuate the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

The control package requires the user to provide 24 VDC at terminals 2 and 3. You are also required to provide dry contacts at terminals 2 and 6, each time the pump should be actuated. All electronics in this package are housed in explosion proof enclosures and are rated for use in Class I, Division 1, Groups C and D hazardous locations.

figure 42



PARTS LIST			
LOCATION	QTY	PART NUMBER	DESCRIPTION
K1	1	E0-6007	TIME DELAY RELAY
RI	1	G1-0112	RESISTOR SSEMBLY
D1	1	E0-2003	DIODE

SECTION 4: SYSTEM CONTROL & ELECTRONICS

Pneumatic Actuated "- 1B" (120 VAC) Control Option

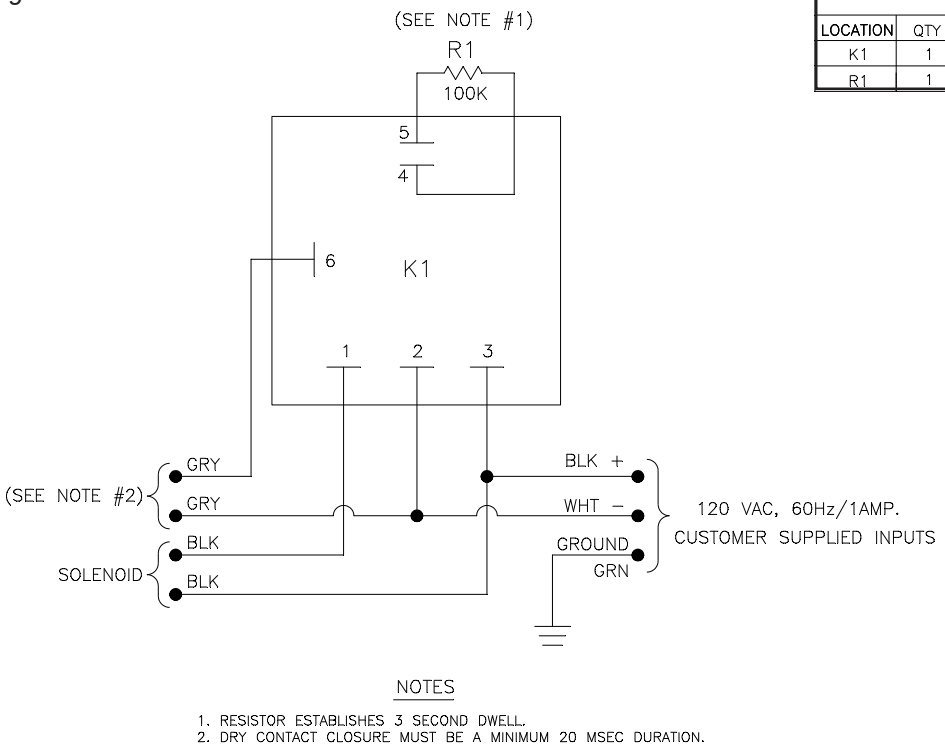
The electronic control package provided with this sampling system consists of a solid state Time Delay Relay (TDR), and a solenoid. The TDR converts a continuous voltage signal into a 3 second voltage output to the solenoid, everytime a contact closure occurs. This 3 second duration allows sufficient time to actuate the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

The control package requires you to provide 120 VAC at terminals 2 and 3. You are also required to provide dry contacts at terminals 2 and 6, in order to stroke the pump. All electronics are housed in explosion proof enclosures and are rated for use in Class I, Division 1, Groups C and D hazardous locations. Refer to Section 5 for programming information.

figure 43



PARTS LIST			
LOCATION	QTY	PART NUMBER	DESCRIPTION
K1	1	E0-6003	TIME DELAY RELAY
R1	1	G1-0059	RESISTOR ASSEMBLY

NOTES

1. RESISTOR ESTABLISHES 3 SECOND DWELL.
2. DRY CONTACT CLOSURE MUST BE A MINIMUM 20 MSEC DURATION.

SECTION 4: SYSTEM CONTROL & ELECTRONICS

Pneumatic Actuated "- 4A" (24VDC / 4-20 mA) Control Option

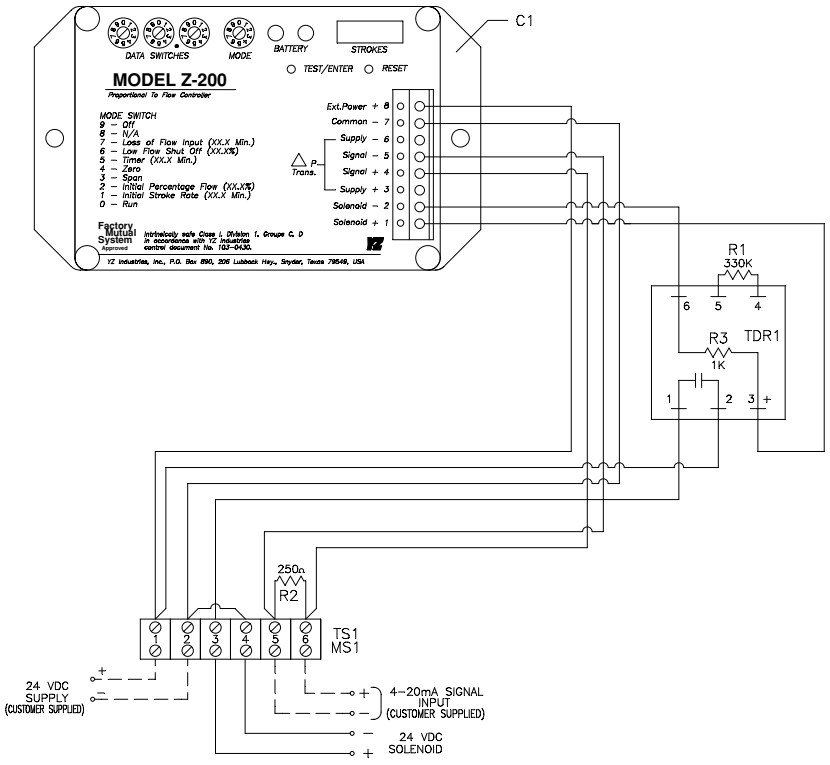
The electronic control package provided with this sampling system consists of a solid state Z-200 controller, opto relay, and time delay relay, to fire a solenoid. The Z-200 utilizes customer programmed parameters and the customer supplied 4-20mA flow control signal to converts a continuous voltage signal into a 3 second voltage output to the solenoid, everytime a sample is required of the system. This 3 second duration allows sufficient time to stroke the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

This control package requires you to provide 24 VDC at TS1 terminals 1 and 2(Z-200 terminal #7 & #8). You are also required to provide a 4-20 mA flow control signal at TS1 terminals 5 and 6 (N-200 terminal #4 & #5), in order to stroke the pump. All electronics are rated for use in Class I, Division 1, Groups C and D hazardous locations. Refer to Section 5 for programming information, and Appendix A for Wiring Control Document.

figure 44



PARTS LIST			
LOCATION	QTY	PART NUMBER	DESCRIPTION
C1	1	F2–0002	Z–200 FLOW CONTROLLER
TDR1	1	E0–6007	TIME DELAY RELAY
TS1	1	H1–0063	TERMINAL STRIP 6 POS.
MS1	1	H1–0064	MARKER STRIP 6 POS.
R1	1	G1–0024	RESISTOR ASSY. 330K
R2	1	E0–1001	RESISTOR, 250Ω
R3	1	E0–1010	RESISTOR, 1K

NOTES

1. CUSTOMER SUPPLIED

SECTION 4: SYSTEM CONTROL & ELECTRONICS

Pneumatic Actuated "- 4B" (120VAC / 4-20 mA) Control Option

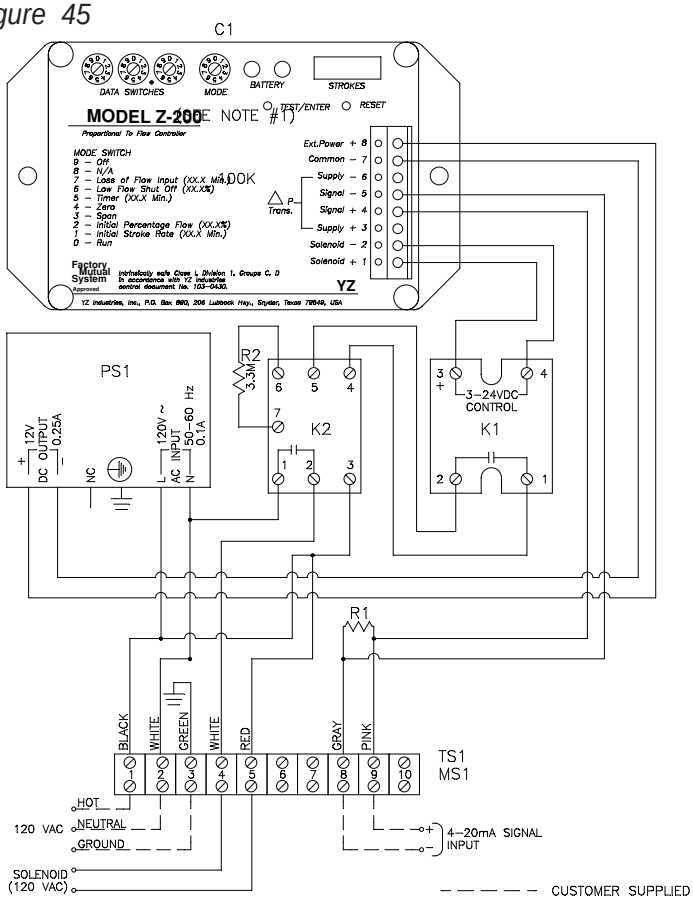
The electronic control package provided with this sampling system consists of a solid state Z-200 controller, opto relay, and time delay relay, to fire a solenoid. The Z-200 utilizes customer programmed parameters and the customer supplied 4-20mA flow control signal to converts a continuous voltage signal into a 3 second voltage output to the solenoid, everytime a sample is required of the system. This 3 second duration allows sufficient time to stroke the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

This control package requires you to provide 120 VAC at TS1 terminals 1, 2, and 3(Z-200 terminal #7 & #8). You are also required to provide a 4-20 mA flow control signal at TS1 terminals 8 and 9 (N-200 terminal #4 & #5), in order to stroke the pump. All electronics are rated for use in Class I, Division 1, Groups C and D hazardous locations. Refer to Section 5 for programming information, and Appendix A for Wiring Control Document.

figure 45



PART LIST			
REF.	PART NO.	DESCRIPTION	QTY.
R1	E0–1001	RESISTOR	1
K1	E0–6008	RELAY	1
PS1	E0–7001	12VDC POWER SUPPLY	1
C1	F2–0002	Z–200 CONTROLLER	1
TS1	H1–0059	TERMINAL STRIP	1
MS1	H1–0060	MARKER STRIP	1
K2	E0–6003	TIME DELAY RELAY	1
R2	G1–0023	RESISTOR ASSEMBLY	1

SECTION 4: SYSTEM CONTROL & ELECTRONICS

Pneumatic Actuated "- 6A" (12-24 VDC / Z-65 Timer/Counter) Control Option

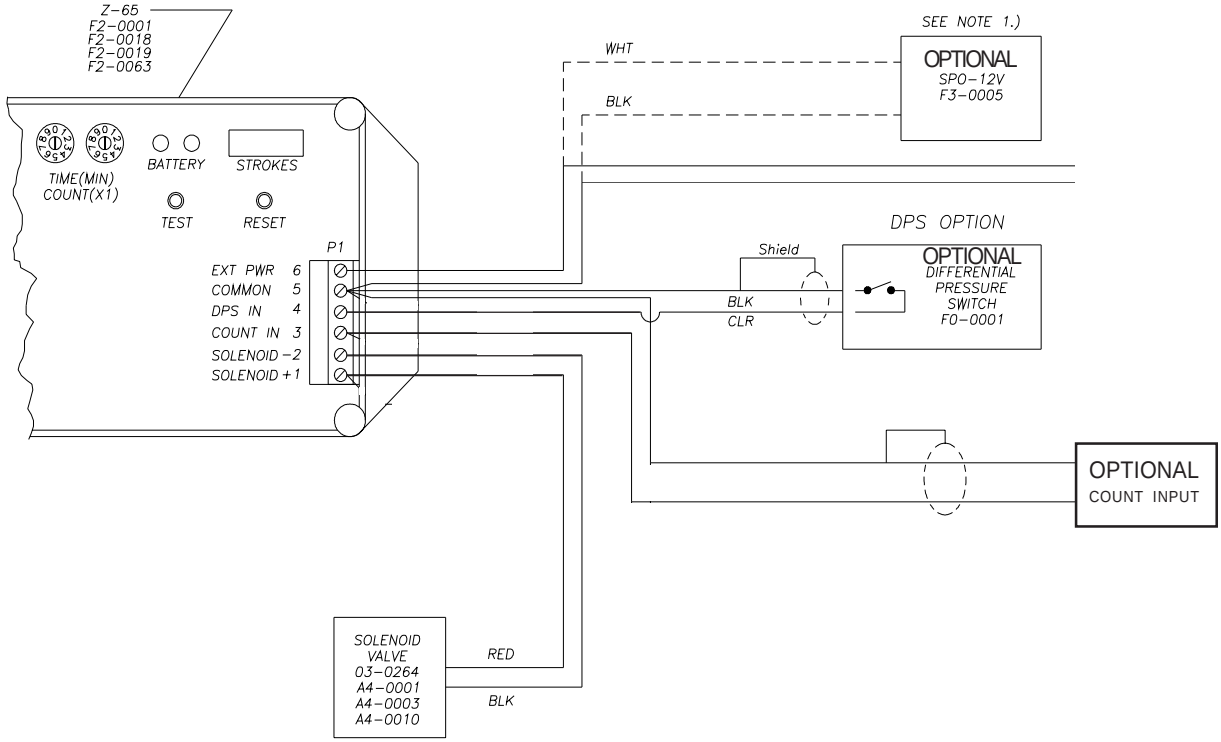
The electronic control package provided with this sampling system consists of a solid state Z-65 timer/ counter controller, to fire a solenoid. The Z-65 utilizes customer programmed parameters and the customer supplied metered contact pulses to convert a continuous voltage signal into a 3 second voltage output to the solenoid, everytime a sample is required of the system. This 3 second duration allows sufficient time to actuate the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

This control package requires you to provide 12-24 VDC at Z-65 terminal #5 & #6. You also may need to provide a metered contact pulse control signal at Z-65 terminal #3 & #5 (for counter mode), in order to stroke the pump. All electronics are rated for use in Class I, Division 1, Groups C and D hazardous locations. Refer to Section 5 for programming information, and Appendix A for Wiring Control Document.

figure 46



SECTION 4: SYSTEM CONTROL & ELECTRONICS

Pneumatic Actuated "- 6B" (120VAC / Z-65 Timer/Counter) Control Option

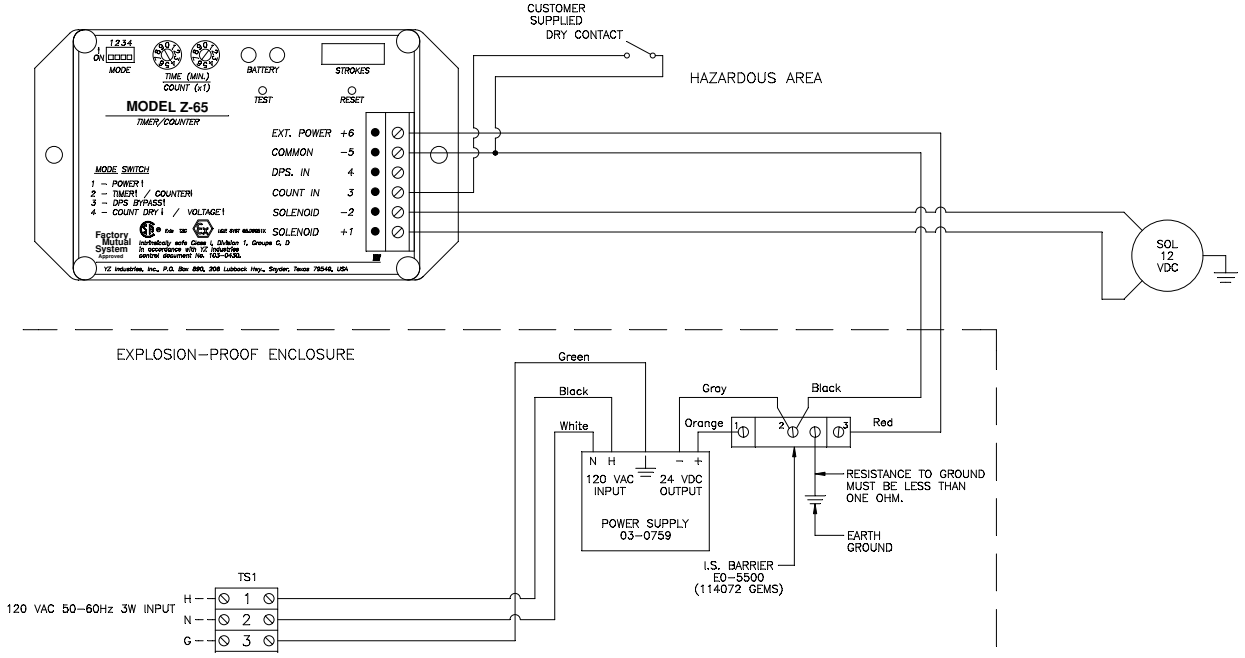
The electronic control package provided with this sampling system consists of a solid state Z-65 timer/ counter controller, to fire a solenoid. The Z-65 utilizes customer programmed parameters and the customer supplied metered contact pulses to convert a continuous voltage signal into a 3 second voltage output to the solenoid, everytime a sample is required of the system. This 3 second duration allows sufficient time to actuate the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

This control package requires you to provide 120 VAC at TS1 terminals 1, 2, and 3. You also may need to provide customer supplied metered contact pulses at Z-65 terminal #3 & #5 (counter mode), in order to stroke the pump. All electronics are rated for use in Class I, Division 1, Groups C and D hazardous locations. Refer to Section 5 for programming information, and Appendix A for Wiring Control Document.

figure 47



Pneumatic Actuated "- 6M (12-24 VDC / Z-65 Timer/Counter w/PIM Card) Control Option

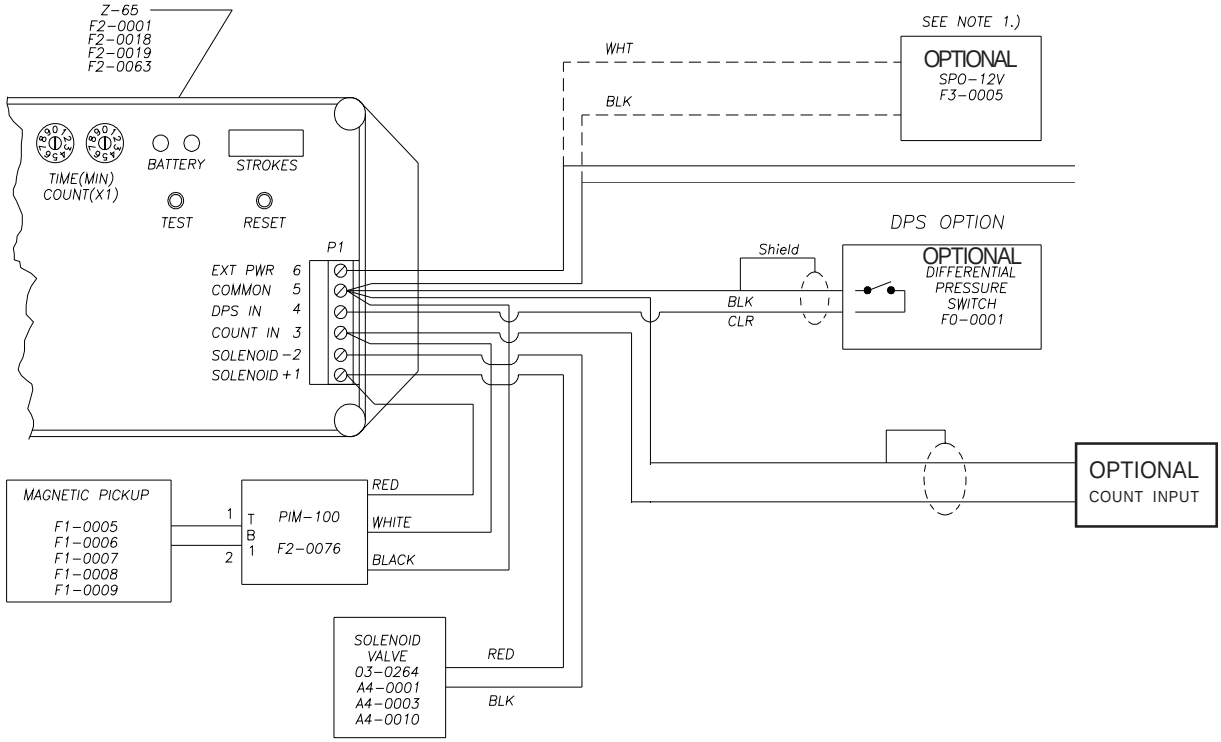
The electronic control package provided with this sampling system consists of a solid state Z-65 timer/counter controller, to fire a solenoid. The Z-65 utilizes customer programmed parameters and the customer supplied metered contact pulses to convert a continuous voltage signal into a 3 second voltage output to the solenoid, everytime a sample is required of the system. This 3 second duration allows sufficient time to actuate the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

This control package requires you to provide 12-24 VDC at Z-65 terminal #5 & #6. You also may need to provide a Magnetic pick-up pulse control signal at PIM-100 terminal #1 & #2 (for meter counter mode), in order to stroke the pump. All electronics are rated for use in Class I, Division 1, Groups C and D hazardous locations. Refer to Section 5 for programming information, and Appendix A for Wiring Control Document.

figure 48



SECTION 4: SYSTEM CONTROL & ELECTRONICS

Pneumatic Actuated "- 7B" (120 VAC / ATC 4 Digit Counter) Control Option

The electronic control package provided with this sampling system consists of a solid state 4 digit counter, to fire a solenoid. The counter utilizes customer programmed parameters and the customer supplied metered contact pulses to convert a continuous voltage signal into a 3 second voltage output to the solenoid, everytime a sample is required of the system. This 3 second duration allows sufficient time to stroke the sample pump and retrieve a single sample.

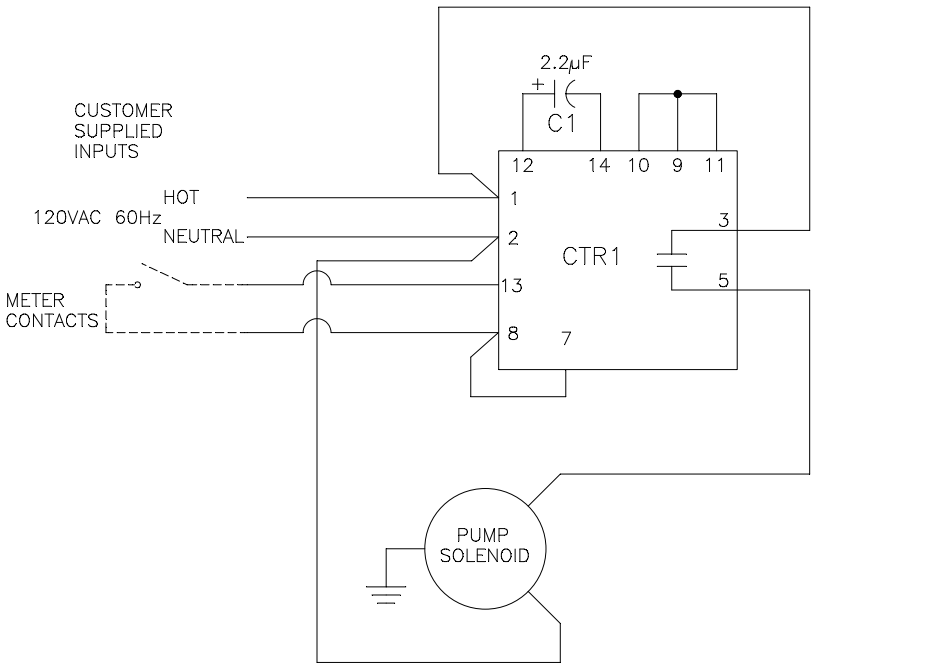
SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

This control package requires you to provide 120 VAC at terminals 1, and 2. You are also required to provide customer supplied metered contact pulses at terminals 13 and 8, in order to stroke the pump. All electronics are rated for use in Class I, Division 1, Groups C and D hazardous locations. Refer to Section 5 for programming information.

figure 49

PARTS LIST			
LOCATION	QTY	PART NUMBER	DESCRIPTION
C1	1	E0-1011	2.2µF, TANTALUM CAPACITOR
CTR1	1	E0-5612	COUNTER, 4 DIGIT



SECTION 4: SYSTEM CONTROL & ELECTRONICS

Hydraulic Actuated "- 1B" (120 VAC) Control Option

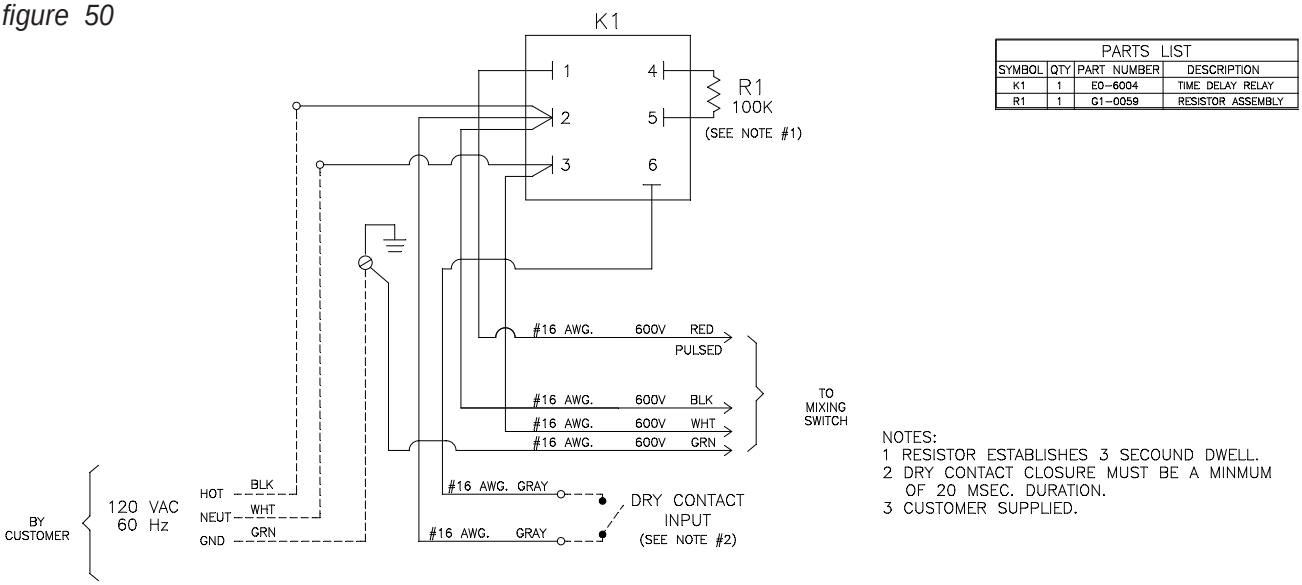
The electronic control package provided with this sampling system consists of a solid state Time Delay Relay (TDR). The TDR converts a continuous voltage signal into a 3 second voltage output to the hydraulic power pack, everytime a contact closure occurs. This 3 second duration allows sufficient time to actuate the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

The control package requires you to provide 120 VAC at terminals 2 and 3. You are also required to provide dry contacts at terminals 2 and 6, in order to stroke the pump. All electronics are housed in explosion proof enclosures and are rated for use in Class I, Division 1, Groups C and D hazardous, locations. Refer to Section 5 for programming information.

figure 50



PARTS LIST			
SYMBOL	QTY	PART NUMBER	DESCRIPTION
K1	1	E0-6004	TIME DELAY RELAY
R1	1	G1-0059	RESISTOR ASSEMBLY

SECTION 4: SYSTEM CONTROL & ELECTRONICS

Hydraulic Actuated "- 4B" (120VAC / 4-20mA) Control Option

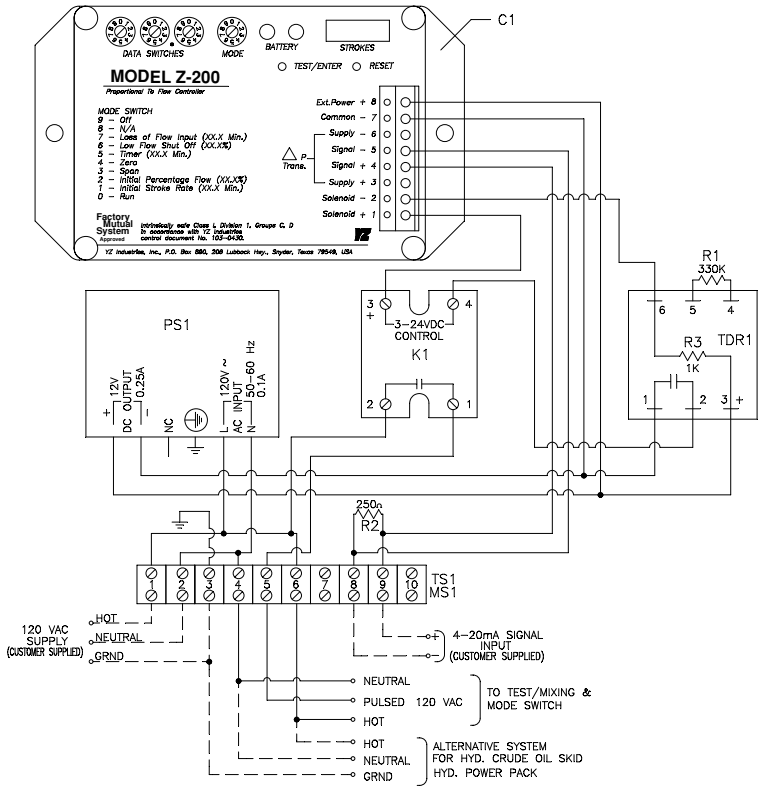
The electronic control package provided with this sampling system consists of a solid state Z-200 controller, power supply/converter, opto relay, and time delay relay, to fire the hydraulic power pack. The Z-200 utilizes customer programmed parameters and the customer supplied 4-20mA flow control signal to converts a continuous voltage signal into a 3 second voltage output to the hydraulic power pack, everytime a sample is required of the system. This 3 second duration allows sufficient time to stroke the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

This control package requires you to provide 120 VAC at TS1 terminals 1, 2, and 3. You are also required to provide a 4-20 mA flow control signal at TS1 terminals 8 and 9, in order to stroke the pump. All electronics are rated for use in Class I, Division 1, Groups C and D hazardous locations. Refer to Section 5 for programming information, and Appendix A for Wiring Control Document.

figure 51



PARTS LIST			
LOCATION	QTY	PART NUMBER	DESCRIPTION
C1	1	F2–0002	Z–200 FLOW CONTROLLER
PS1	1	E0–7001	POWER SUPPLY, 12VDC
K1	1	E0–6005	SOLID STATE RELAY
TDR1	1	E0–6006	TIME DELAY RELAY
TS1	1	H1–0059	TERMINAL STRIP 10 POS.
MS1	1	H1–0060	MARKER STRIP 10 POS.
R1	1	G1–0024	RESISTOR ASSY. 330K
R2	1	E0–1001	RESISTOR, 250 Ω
R3	1	E0–1010	RESISTOR, 1K

SECTION 4: SYSTEM CONTROL & ELECTRONICS

Hydraulic Actuated "- 7B" (120 VAC / ATC 4 Digit Counter)Control Option

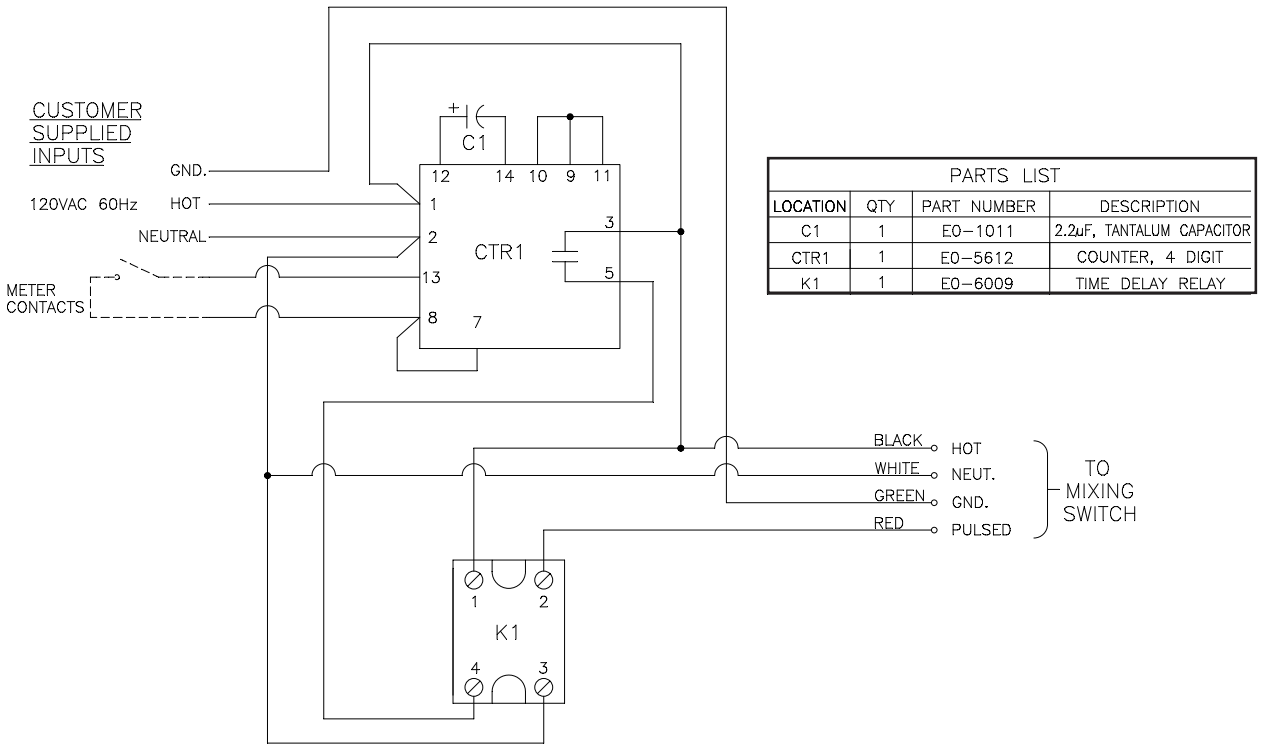
The electronic control package provided with this sampling system consists of a solid state 4 digit counter, and opto relay, to fire a Hydraulic Power Pack. The counter utilizes customer programmed parameters and the customer supplied metered contact pulses to convert a continuous voltage signal into a 3 second voltage output to the Hydraulic Power Pack, everytime a sample is required of the system. This 3 second duration allows sufficient time to stroke the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

This control package requires you to provide 120 VAC at terminals 1, and 2. You are also required to provide customer supplied metered contact pulses at terminals 13 and 8, in order to stroke the pump. All electronics are rated for use in Class I, Division 1, Groups C and D hazardous locations. Refer to Section 5 for programming information.

figure 52



PARTS LIST			
LOCATION	QTY	PART NUMBER	DESCRIPTION
C1	1	E0-1011	2.2µF, TANTALUM CAPACITOR
CTR1	1	E0-5612	COUNTER, 4 DIGIT
K1	1	E0-6009	TIME DELAY RELAY

Notes

SECTION 5: PROGRAMMING FOR OPERATION

Setting Operator Input Parameters

The Light Liquid sampling systems are designed to sample light liquid hydrocarbons. Thousands of individual samples are captured and combined to develop a representative, composite sample of the flowing pipeline.

Operation of the sampling system centers around the following primary components: the Sample Pump, the Product Accumulator Vessel, the Precharge Gas Vessel, and the Electronic Control System. The following pages provide specific details for setting up your controller for operation.

The sampling system operates on a simple concept. When the system receives a proper flow signal (by others), the electronic control unit energizes either a solenoid valve, or a Hydraulic Power Pack. Energizing the solenoid valve, or Hydraulic Power Pack allows a pressurized pulse into the actuation cylinder of the sample pump, which in turn causes the pump to stroke. When the pump strokes, a small sample is displaced into the product accumulator vessel. Once the solenoid valve, or Hydraulic Power Pack is de-energized, the sample pump plunger returns to its normal position. This action allows a new sample into the pump.

The purpose of the YZ light liquid hydrocarbon sampling system is to capture and maintain a representative liquid sample of the pipeline product. The sampled product is maintained in a liquid phase by the product accumulator vessel's free floating piston and the precharge gas system. In order for the system to function properly, pipeline product must be single phase, liquid product.

By properly adjusting both the sample size and the sample frequency, the sample vessel will fill to 80% capacity at the end of the sample period.

SECTION 5: PROGRAMMING FOR OPERATION

Setting Operator Input Parameters

"-0" Control Options

The electronic control package for this sampling system is completely customer provided. The system is provided with a solenoid to actuate the sample pump which requires a voltage pulsed signal with a dwell time of 3 seconds to properly actuate the sample pump. This 3 second duration allows sufficient time to stroke the sample pump and retrieve a single sample.

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

All electronics are housed in explosion proof
enclosures and are rated for use in Class I, Division 1, Groups C and D hazardous locations.

The customer supplied control system should be programed to operate in the following manner.

figure 53

Calculating Metered Volume per Pulse:

A = 4,542 cc (80% of 1.5 gallon vessel)
B = 2,000 Barrels of Product/Day
C = 30 Days
D = Pump Displacement per Stroke

$$\frac{\text{4,545 cc}}{\text{30 Days}} = \text{151.4cc of Sample Volume/Day}$$

$$\frac{\text{151.4cc of Sample Volume/Day}}{\text{1.8 cc/Pump Stroke}} = \text{84 Pump Strokes/Day}$$

$$\frac{\text{2,000 BBl/Day}}{\text{84 Pump Strokes/Day}} = \boxed{\text{23.8 Barrels per Pulse Setting}}$$

SECTION 5: PROGRAMMING FOR OPERATION
Setting Operator Input Parameters
"-1" Control Options

The proportional to flow control function is actually performed by another customer owned flow monitoring device, like a flow computer. The set up of this other device must be done in conjunction with the set up of the sampler system in such a manner, that the proper amount of sample will be gathered during the duration of the sample cycle, and to assure that the integrity of the proportional relationship between the gathered sample, and the flowing volume in the pipeline is maintained.

The maximum amount of sample that can be safely placed in the accumulator vessel is 80% of the total vessel volume. There are two ways to arrive at the settings for the Proportional to Flow Control.

Sampler Control Set-up Option #1

This method is based on the peremise that the Metered Volume per pulse value in the flow monitoring device, is already set to a predetermined value by the customer.

Calculate the pump displacement setting using the following formula:

$$\text{Pump Displacement Setting} = \frac{D \times E}{B \times C}$$

Where, B = Average Flow rate (Gal/day or BBL/day)

C = Sample Cycle (days)

D = Metered volume per pulse (Gal/pulse or BBL/pulse)

E = 80% sample accumulator volume (cc)

For 1.5 gallon accumulators, E = 4,542 cc

refer to Example #1, figure 54, page 52.

The pump setting must be within range of 0.25 to 1.8 cc / stroke, *refer to section 2, page 31, for setting the pump displacement.*

SECTION 5: PROGRAMMING FOR OPERATION

Setting Operator Input Parameters

"-1" Control Options

Example #1

figure 54

Calculating Pump Setting:

B = 2,000 Barrels of Product/Day
C = 30 Days
D = 10 Barrels/pulse
E = 4,542 cc (80% of 1.5 gallon vessel)

$$\frac{(10\ \text{Barrels/pulse}) \times (4{,}542\ \text{cc})}{(2{,}000\ \text{Barrels/day}) \times (30\ \text{Days})} = .75\ \text{cc/Stroke Pump Setting}$$

Example #2

figure 55

Calculating Metered Volume per Pulse:

A = 4,542 cc (80% of 1.53 gallon vessel)
B = 2,000 Barrels of Product/Day
C = 30 Days
D = Pump Displacement per Stroke

$$\frac{4{,}545\ \text{cc}}{30\ \text{Days}} = 151.4\text{cc of Sample Volume/Day}$$

$$\frac{151.4\text{cc of Sample Volume/Day}}{1.8\ \text{cc/Pump Stroke}} = 84\ \text{Pump Strokes/Day}$$

$$\frac{2{,}000\ \text{BBl/Day}}{84\ \text{Pump Strokes/Day}} = 23.8\ \text{Barrels per Pulse Setting}$$

SECTION 5: PROGRAMMING FOR OPERATION

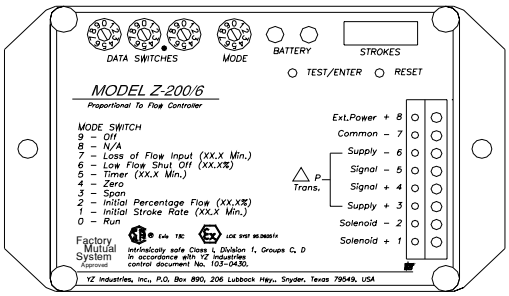
Setting Operator Input Parameters

"-4" Control Options

Proportional To Flow Controller Programming

In this mode of operation, the Z-200 uses operator inputs in conjunction with the 4-20mA flow input to vary the time that will transpire between pump strokes.

figure 56



A. Adjust the pump volume adjustment screw to desired displacement setting.

In order for the Z-200 controller to operate in the proportional-to-flow mode of operation it will be necessary to enter the following parameters:

B. Loss of flow input (XX.X min)
mode #7 default 20.0 minutes.

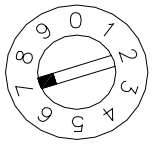
The loss of flow input setting is a predetermined amount of time that the operator would like to see transpire between pump strokes in the event that the 4-20mA flow input signal is lost.

To set the loss of flow input

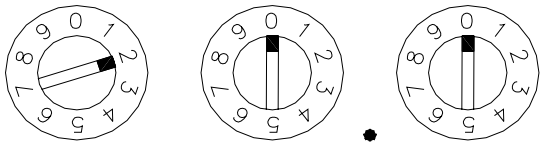
1. Set the mode switch to position #7.
2. Set the data switches to the desired time in minutes XX.X minutes.

   Example: 20 minutes = 20.0

3. Depress the enter switch to load the value into memory.



MODE

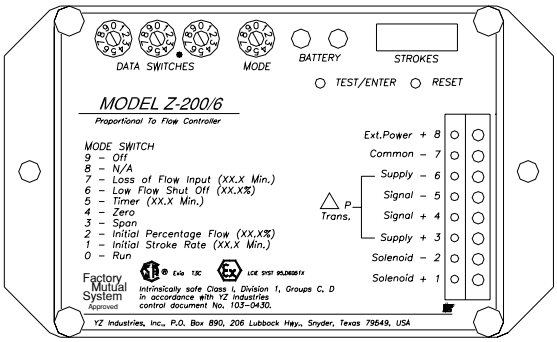


DATA SWITCHES

NOTE: *the green LED will flash if entry is accepted; the red LED will flash if not accepted.*

SECTION 5: PROGRAMMING FOR OPERATION
Setting Operator Input Parameters
"-4" Control Options

figure 57



C. Low flow shut-off
(XX.X%) Mode #6 Default 2.0%

The low flow shut-off setting allows a preset point in % of flow to be set that the operator would like the Z-200 to stop operating. This allows the controller to sense low flow conditions that might exist in the pipeline where operation of the Z-200 controller is not wanted. When flow again increases above this point the Z-200 will again resume operation.

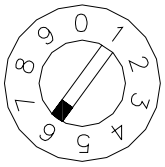
To set the low flow shut-off
1. Set the mode switch to position #6.

2. Set the data switches to the desired % flow XX.X%.

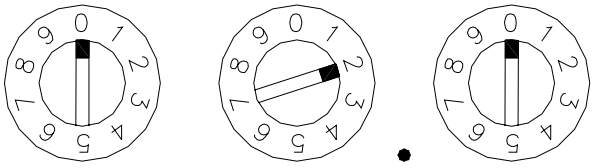
Example: 2% - 20.0

3. Depress the enter switch to load the value into memory.

NOTE: *the green LED will flash if entry is accepted; the red LED will flash if not accepted.*



MODE



DATA SWITCHES

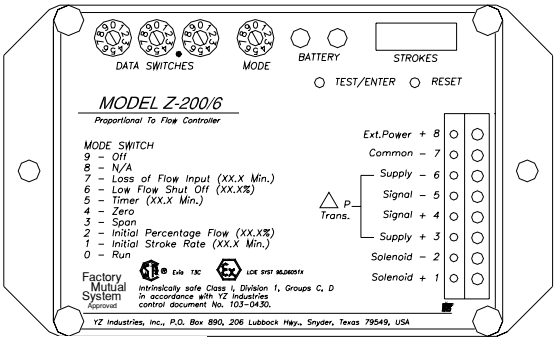
D. Zero calibration
Mode #4 (1.00VDC @ 0% of metered flow)

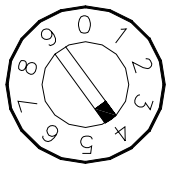
The zero calibration adjustment is used to calibrate the Z-200 controller for 0% of metered flow in the pipeline. The Z-200 controller is calibrated at the factory for 0% of flow to directly correspond to 4mA (1.00VDC) a the flow input terminals #4, #5.

To set zero calibration
1. Set the mode switch to #4.
2. Apply 4mA to the TS-1 terminal strip terminal #9 (+signal input); terminal #8 (-signal input), a 250 Ohm resistor is in the circuit to the Z-200, which converts this to 1 VDC at the N-200 treminals #4 and #5.
3. Depress the enter switch to load the zero setting into memory

NOTE: *the green LED will flash if entry is accepted; the red LED will flash if not accepted.*

figure 58





MODE

SECTION 5: PROGRAMMING FOR OPERATION
Setting Operator Input Parameters
"-4" Control Options
Proportional To Flow Controller Programming

E. Span calibration
Mode #3 (5.00VDC @ 100% of metered flow)

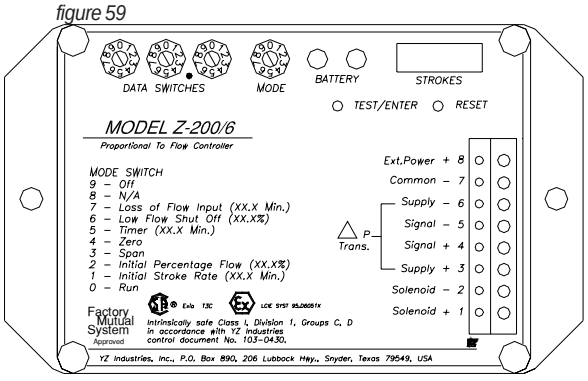
The span calibration adjustment is used to calibrate the Z-200 controller for 100% of metered flow in the pipeline. The Z-200 controller is calibrated at the factory for 100% flow to directly correspond to 20mA or 5.00VDC a the flow input terminals #4, #5.

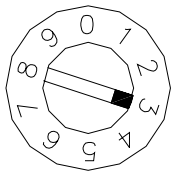
To set the span calibration

1. Set the mode switch to position #3.
2. Apply 20mA to the TS-1 terminal strip terminal #9 (+signal input); terminal #8 (-signal input), a 250 Ohm resistor is in the circuit to the Z-200, which converts this to 5 VDC at the N-200 treminals #4 and #5.
3. Depress the enter switch to load the span setting into memory.

NOTE: *the green LED will flash if entry is accepted; the red LED will flash if not accepted.*

figure 59





MODE

F. Initial percentage flow
(XX.X%) Mode #2 Default 50.0%

The initial percentage flow should be set by the operator to the typical or average % of metered flow that exists in the pipeline. This should be based upon historical flow measurement records from the metering device being used. If the history is not known, use an anticipated value.

To set initial percentage flow

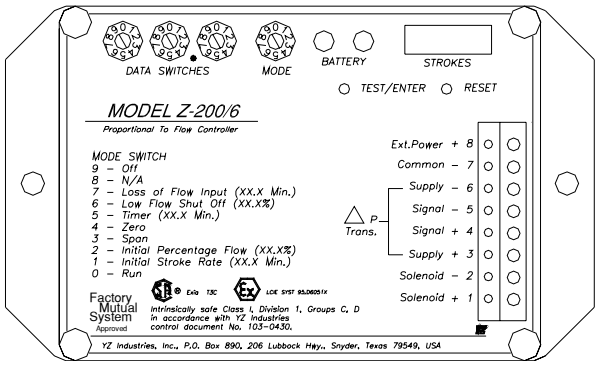
1. Set the mode switch to position #2.
2. Set the data switches to the desired % of flow X.XX%.

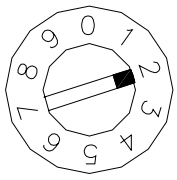
Example: 50% - 50.00

3. Depress the enter switch to load the value into memory.

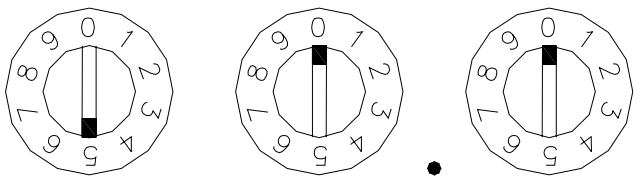
NOTE: *the green LED will flash if entry is accepted the red LED will flash if not accepted.*

figure 60





MODE



DATA SWITCHES

SECTION 5: PROGRAMMING FOR OPERATION
Setting Operator Input Parameters
"-4" Control Options
Proportional To Flow Controller Programming

G. Initial stroke rate
(XX.X min) Mode#1 Default 20.0 min

The initial stroke rate is set by the operator to the amount of time that would be desired to transpire between pump strokes if the % of flow measured in the pipeline was equal to that set in mode position #2 (initial percentage flow).

To set the initial stroke rate

1. Set the mode switch to position #1.

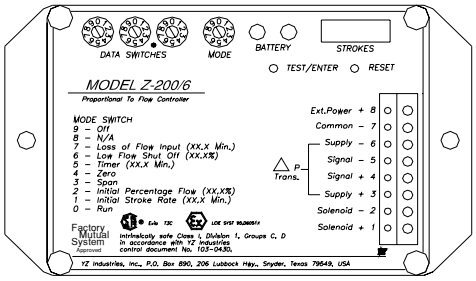
2. Set the data switches to the desired time minutes X.XX min

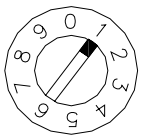
Example: 20 minutes = 20.0

3. Depress the enter switch to load the value into memory.

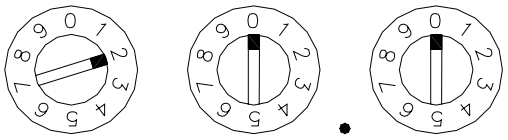
NOTE: *the green LED will flash if entry is accepted; the red LED will flash if not accepted.*

figure 61





MODE



DATA SWITCHES

NOTE: Time (20.0 minutes) above corresponds to dial setting shown for the Z-200.1 model. (For the Z-200.10, the time would be 2.00 minutes - the decimal moves one place to the left).

H. Run Mode

the run mode position is the position that the mode switch should be in to start the Z-200 controller in proportional-to-flow mode of operation. When in this mode of operation the Z-200 controller will monitor the flow input and adjust the time interval between pump strokes to be proportional to the % of flow measured in the pipeline.

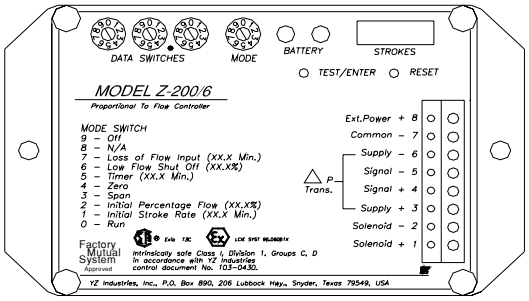
To start the Z-200 controller

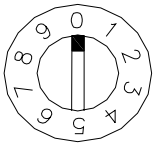
1. To set the mode switch to position #0.

2. Depress the enter switch to begin operation.

NOTE: *if all parameters (mode #'s 7.6.4.3.2.1) have not been entered properly, a red LED will illuminate and stay on and the controller will not start in the run mode position #0 when the enter switch is depressed.*

figure 62





MODE

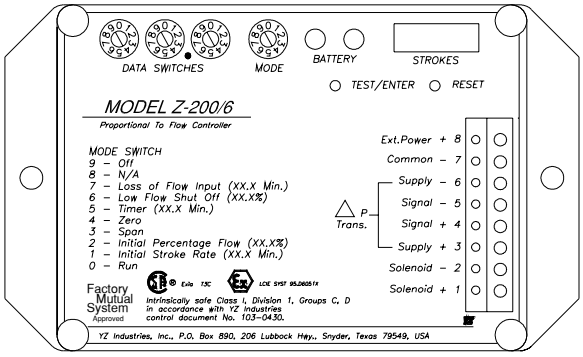
SECTION 5: PROGRAMMING FOR OPERATION

Setting Operator Input Parameters

"-4" Control Options

Sampler Set-up - time-based Sampling

figure 63



The Z-200 controller operates as a recycling timer. The time between solenoid actuations is set by the operator and does not change in respect to pipeline flow conditions.

A. Calculate the sampling rate using the following information:

Example

1.5 Gallon Accumulator Vessel X 3785 cc/Gal. X 80% = **4542 cc/Sample Period**

4542 cc/Sample Period = **2523 Pump Strokes/Sample Period**
1.8cc/Pump Stroke

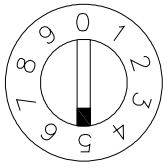
2523 Pump Strokes/Sample Period = **84 Strokes/Day**
30 Days/Sample Period

1440 Min./Day = 17.14 Min/Stroke (Round Up to the next 1/10 Minute)....17.2 Minutes
84 Strokes/Day

figure 64

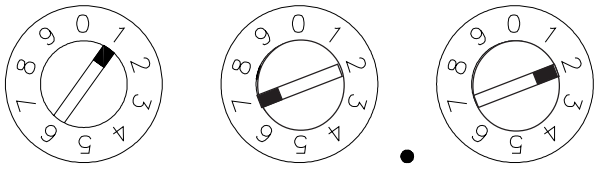
B. Adjust the pump volume adjustment screw to desired displacement setting.

C. Set the mode switch to position #5.



MODE

D. Set the data switches to the desired time in Minutes XX.X minutes.
Example: 17.2 minutes - 17.2



DATA SWITCHES

NOTE: Time (17.20 minutes) above corresponds to dial setting shown for the Z-200.1 model. (For the Z-200.10, the time would be 1.72 minutes - the decimal moves one place to the left).

D. Depress the enter switch to load the time into memory to start operation.

SECTION 5: PROGRAMMING FOR OPERATION
Setting Operator Input Parameters
"-6" Control Options
Setting Proportional to Time Operator Input Parameters

Calculate the sampling rate using the following formula and example:

The two orange count totalization knobs should be set to achieve the final totalization to initiate a stroke of the pump. Use the following example to calculate your values:

5 gallon vessel X 80% = 4 gallons of product to be collected over the entire sample cycle

4 gallons X 3785cc/gallon = 15140cc of product to be collected over the entire sample cycle.

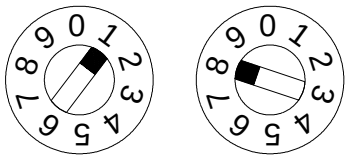
15140cc / 30 days = 504cc/day

504cc/day / 1.8 cc/pump stroke = 280 strokes per day

600 bbl/ Day (Maximum Daily Flow Rate) = 2.14 bbl/pump stroke
280 strokes/Day
Since counts must be counted to the nearest whole count set the Z-65 totalization at 2.

figure 65

Example 18 Minutes



TIME (MIN.)
COUNT (x1)

Set the timer dials on the Z-65/6.1 to the sample rate from step.

NOTE: to obtain maximum battery life, choose the longest time interval and largest pump displacement setting possible.

NOTE: The time (18 minutes) above corresponds to the dial setting shown for the Z-65/6.1 model with the timer range setting in the factory position (jumper on the two left pins).

SECTION 5: PROGRAMMING FOR OPERATION

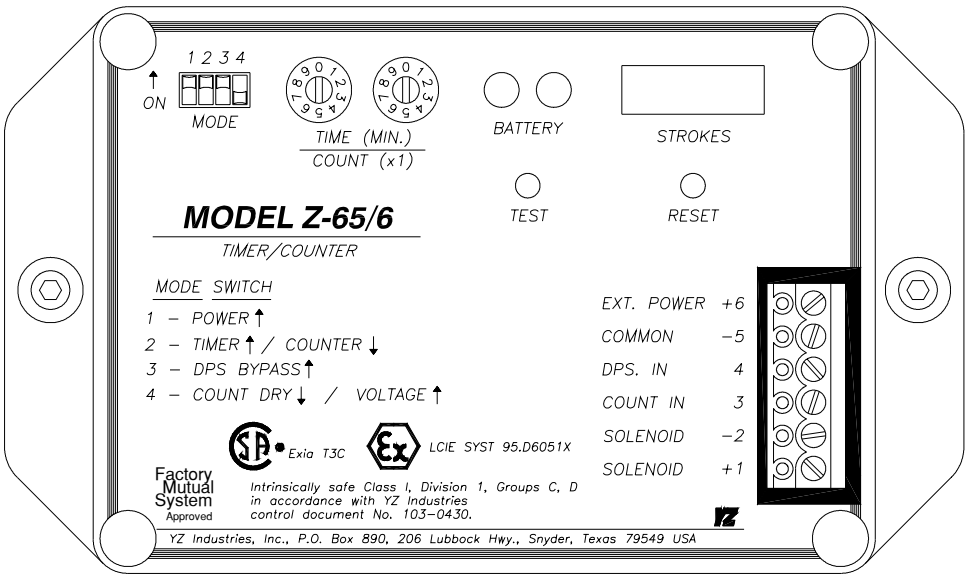
Setting Operator Input Parameters
"-6" Control Options

Setting Proportional to Time Operator Input Parameters

Adjust the pump volume adjustment knob to the value used in the calculations in step.

Sample pump displacement per stroke	Number of turns open on the pump volume knob
.1cc	3
.2cc	6
.4cc	12

figure 66

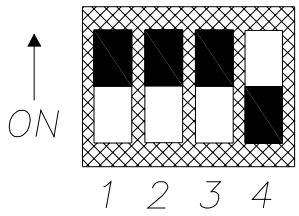


8.4 Turn mode switch 1 to on.

8.5 Turn mode switch 2 to on.

8.6 Turn mode switch 3 to on.

8.7 Turn mode switch 4 to off.



8.8 Press the test button once to initiate the timer sequence.

SECTION 5: PROGRAMMING FOR OPERATION

Setting Operator Input Parameters

"-6" Control Options

Setting Proportional to Flow Operator Input Parameters

Z-65 Controller Set Up:

The Mode Switch should be set as follows:

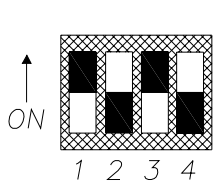
#1 Power "On" ⬆

#2 Counter ⬇

#3 DPS Bypass ⬆

#4 Count Dry ⬇

figure 67



The two orange count totalization knobs should be set to achieve the totalization to initiate a stroke of the pump. Use the following example to calculate your values:

5 gallon vessel X 80% = 4 gallons of product to be collected over the entire sample cycle

4 gallons X 3785cc/gallon = 15140cc of product to be collected over the entire sample cycle.

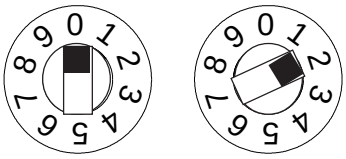
15140cc = 504cc/day
30 days

504cc/day = 280 strokes per day
1.8 cc/pump stroke

600 bbl/ Day (Maximum Daily Flow Rate) = 2.14 bbl/pump stroke
280 strokes/Day

Since counts must be counted to the nearest whole count set the Z-65 totalization at 2, assuming the pulses are sent at rate of 1 pulse per bbl..

Example 2 Counts



TIME (MIN.)

COUNT (x1)

NOTE: The count(2 counts) above corresponds to the dial setting shown for the Z-65/6.1 model with the timer range setting in the factory position (jumper on the two left pins). See Section Timer Range Setting.

Verify Power switch positions:
Turn on the Z-65 power switch. (Z-65 mode S #1).

SECTION 5: PROGRAMMING FOR OPERATION

Setting Operator Input Parameters

"-7" Control Options

Setting Proportional to Flow Operator Input Parameters

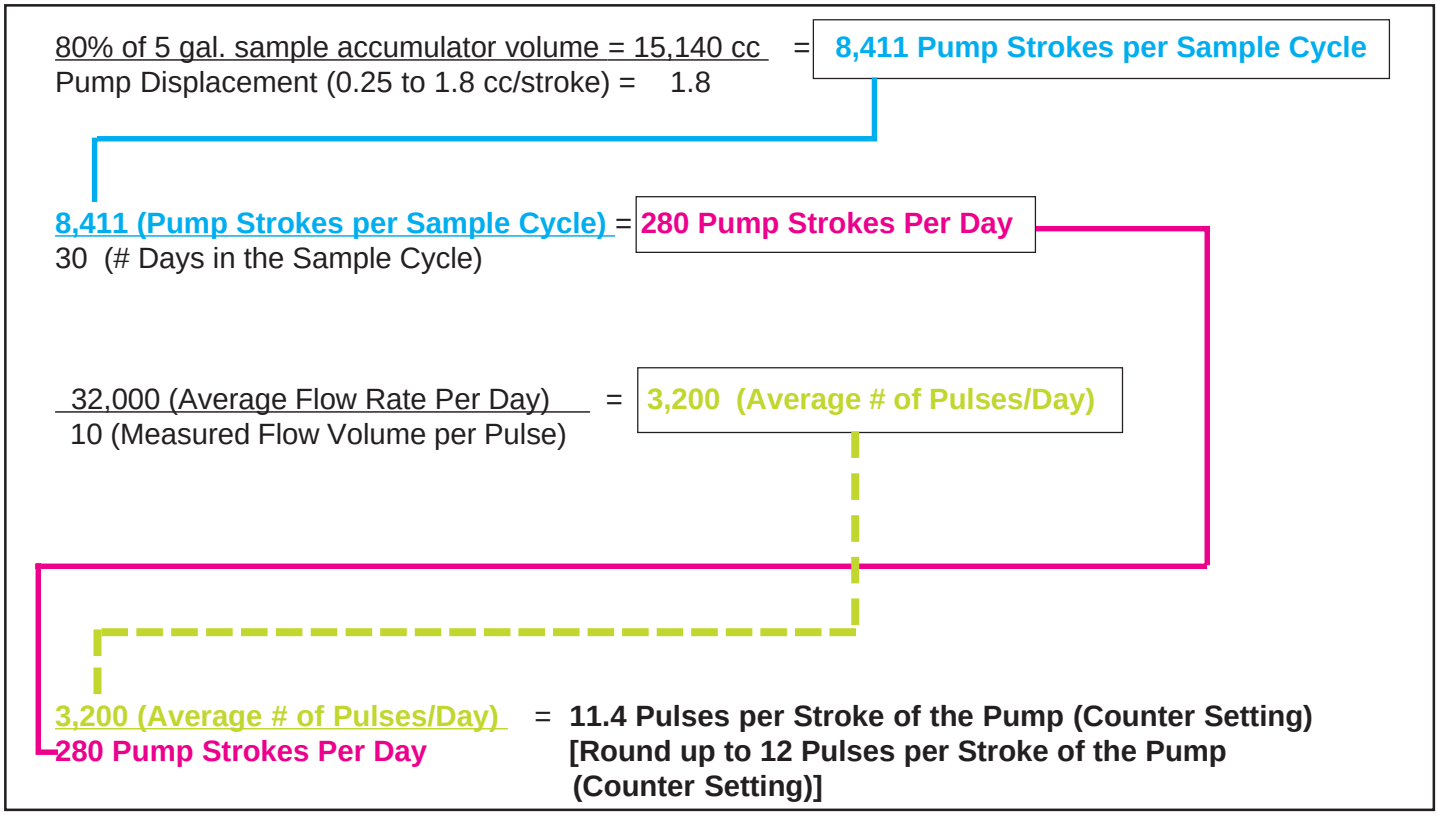
The heart of the electronic control package provided with your sampling system is a totalizing counter. The totalizer counts pulses from meter contacts or other flow monitoring devices. The sample pump is actuated after a predetermined number of pulses have been counted.

The number of pulses required before taking a sample is easily programmed and changed in the totalizer. The totalizer can also sustain a loss of power without having to be reprogrammed.

All electronics are housed in explosion proof enclosures and are rated for use in Class I, Division 1, Groups C and D hazardous locations.

Refer to figure 69 below for calculation example.

figure 69



Notes

SECTION 6: MECHANICAL SYSTEM

PNR-2P Sample Pump & Balance Valve

The PNR-2P Sample Pump, refer to Apendix A, page 87, is a positive displacement plunger pump designed to be mounted directly on the pipeline. It has an adjustable displacement of 0.25 to 1.8cc and achieves proportional-to-flow sampling through adjustment of the system electronic control discussed in Section 5.

As the plunger returns upward after completing a stroke, the pump chamber fills with product through the inlet check valve. The inlet check valve is a dart type valve designed to seat on an o-ring. The inlet check valve is spring loaded to ensure a positive seating action after every stroke. When the pump is actuated , the plunger moves downward, displacing product through the discharge check valve known as the balance valve.

The Balance Valve, refer to Apendix A, page 91, automatically senses pipeline pressure and adjusts to ensure that product is not allowed to free flow to the product vessel. When the pipeline pressure is greater than the precharge pressure on the accumulator vessel, the balance valve dart is pushed up against the seat and the top head of the balance valve. As the pump strokes, the pressure created in the pump chamber forces the balance valve dart off the seat, allowing product to be pumped to the accumulator vessel. Once the pump completes its stroke, the pressure across the balance valve equalizes and the dart is returned to a sealing position by its spring.

In the event that the accumulator vessel precharge pressure is greater than the pipeline pressure, the balance valve dart and seat are pushed apart by the product pressure in the accumulator vessel. In this situation the check valve wafer located between the balance valve and the sample pump acts as a back check to prevent the escape of product previously captured in the accumulator vessel. As the pump strokes, the pressure created in the pump chamber forces the check valve wafer off the seat, allowing product to be pumped to the accumulator vessel. Once the pump completes its stroke, the pressure across the check valve equalizes and the wafer is returned to a sealing position by its spring.

SECTION 6: MECHANICAL SYSTEM

LPR-2P Sample Pump & Balance Valve

The LPR-2 Sample Pump, refer to Appendix A, page 88, is a positive displacement plunger pump designed for slip stream attachment to the pipeline. It has an adjustable displacement of 0.25 to 1.8cc and achieves proportional-to-flow sampling through adjustment of the system electronic control discussed in Section 5.

As the plunger returns upward after completing a stroke, the pump chamber fills with product through the inlet check valve. The inlet check valve is a dart type valve designed to seat on an o-ring. The inlet check valve is spring loaded to ensure a positive seating action after every stroke. When the pump is actuated , the plunger moves downward, displacing product through the discharge check valve known as the balance valve.

The Balance Valve, refer to Appendix A, page 91, automatically senses pipeline pressure and adjusts to ensure that product is not allowed to free flow to the product vessel. When the pipeline pressure is greater than the precharge pressure on the accumulator vessel, the balance valve dart is pushed up against the seat and the top head of the balance valve. As the pump strokes, the pressure created in the pump chamber forces the balance valve dart off the seat, allowing product to be pumped to the accumulator vessel. Once the pump completes its stroke, the pressure across the balance valve equalizes and the dart is returned to a sealing position by its spring.

In the event that the accumulator vessel precharge pressure is greater than the pipeline pressure, the balance valve dart and seat are pushed apart by the product pressure in the accumulator vessel. In this situation the check valve wafer located between the balance valve and the sample pump acts as a back check to prevent the escape of product previously captured in the accumulator vessel. As the pump strokes, the pressure created in the pump chamber forces the check valve wafer off the seat, allowing product to be pumped to the accumulator vessel. Once the pump completes its stroke, the pressure across the check valve equalizes and the wafer is returned to a sealing position by its spring.

SECTION 6: MECHANICAL SYSTEM

PNR-2H Sample Pump & Balance Valve

The PNR-2H Sample Pump, refer to Appendix A, page 89, is a positive displacement plunger pump designed to be mounted directly on the pipeline. It has an adjustable displacement of 0.25 to 1.8cc achieves proportional-to-flow sampling through adjustment of the system electronic control discussed in Section 5.

As the plunger returns upward after completing a stroke, the pump chamber fills with product through the inlet check valve. The inlet check valve is a dart type valve designed to seat on an o-ring. The inlet check valve is spring loaded to ensure a positive seating action after every stroke. When the pump is actuated , the plunger moves downward, displacing product through the discharge check valve.

The Balance Valve, refer to Appendix A, page 91, automatically senses pipeline pressure and adjusts to ensure that product is not allowed to free flow to the product vessel. When the pipeline pressure is greater than the precharge pressure on the accumulator vessel, the balance valve dart is pushed up against the seat and the top head of the balance valve. As the pump strokes, the pressure created in the pump chamber forces the balance valve dart off the seat, allowing product to be pumped to the accumulator vessel. Once the pump completes its stroke, the pressure across the balance valve equalizes and the dart is returned to a sealing position by its spring.

In the event that the accumulator vessel precharge pressure is greater than the pipeline pressure, the balance valve dart and seat are pushed apart by the product pressure in the accumulator vessel. In this situation the check valve wafer located between the balance valve and the sample pump acts as a back check to prevent the escape of product previously captured in the accumulator vessel. As the pump strokes, the pressure created in the pump chamber forces the check valve wafer off the seat, allowing product to be pumped to the accumulator vessel. Once the pump completes its stroke, the pressure across the check valve equalizes and the wafer is returned to a sealing position by its spring.

SECTION 6: MECHANICAL SYSTEM

LPR-2H Sample Pump & Balance Valve

The LPR-2H Sample Pump, refer to Appendix A, page 90, is a positive displacement plunger pump designed for slip stream attachment to the pipeline. It has an adjustable displacement of 0.25 to 1.8cc and achieves proportional-to-flow sampling through adjustment of the system electronic control discussed in Section 5.

As the plunger returns upward after completing a stroke, the pump chamber fills with product through the inlet check valve. The inlet check valve is a dart type valve designed to seat on an o-ring. The inlet check valve is spring loaded to ensure a positive seating action after every stroke. When the pump is actuated , the plunger moves downward, displacing product through the discharge check valve known as the balance valve.

The Balance Valve, refer to Appendix A, page 91, automatically senses pipeline pressure and adjusts to ensure that product is not allowed to free flow to the product vessel. When the pipeline pressure is greater than the precharge pressure on the accumulator vessel, the balance valve dart is pushed up against the seat and the top head of the balance valve. As the pump strokes, the pressure created in the pump chamber forces the balance valve dart off the seat, allowing product to be pumped to the accumulator vessel. Once the pump completes its stroke, the pressure across the balance valve equalizes and the dart is returned to a sealing position by its spring.

In the event that the accumulator vessel precharge pressure is greater than the pipeline pressure, the balance valve dart and seat are pushed apart by the product pressure in the accumulator vessel. In this situation the check valve wafer located between the balance valve and the sample pump acts as a back check to prevent the escape of product previously captured in the accumulator vessel. As the pump strokes, the pressure created in the pump chamber forces the check valve wafer off the seat, allowing product to be pumped to the accumulator vessel. Once the pump completes its stroke, the pressure across the check valve equalizes and the wafer is returned to a sealing position by its spring.

SECTION 6: MECHANICAL SYSTEM

Accumulator Vessel

The YZ Product Accumulator Vessel, refer to Apendix A, page 94, is designed to maintain a composite sample in the liquid phase. This is accomplished by using a free-floating piston design and an inert precharge gas system, refer to Apendix A, page 93. As product is collected in the accumulator vessel, the precharge gas system maintains a constant pressure on top of the vessel piston. If this pressure is at least 100 to 150 psi above the vapor pressure of the product being sampled, the sampled product will be prevented from flashing to the vapor phase.

Product enters the cylinder through the head in the bottom of the cylinder. This head is the accumulator vessel product head. The precharge gas is communicated to the accumulator vessel through the precharge head, which is located on the top of the accumulator cylinder.

The actuator assembly is located on the top of the accumulator cylinder and serves two functions. The first is to provide mixing of the sampled product by moving the mixing disc up and down within the product portion of the accumulator cylinder. This is done by introducing pressure to one side of the mixer piston assembly and then by applying pressure to the opposite side of the mixer piston assembly.

The second function of the actuator assembly is to provide indication of the amount of product collected within the vessel. This is shown locally on the magnetic volume scale mounted on the actuator assembly cylinder.

5-Way Cross

The Five-way Cross Assembly, refer to Apendix A, page 92, is located on the front of the skid and includes the following items: product inlet tubing fitting, pressure gauge, relief valve, rob valve, accumulator vessel isolation valve/discharge tubing fitting, and the five-way cross.

The pressure gauge is used during normal operation to indicate the pressure within the accumulator vessel. During start-up and troubleshooting procedures it is used in conjunction with the accumulator vessel isolation valve to check pump performance.

The YZ relief valve is a reseating type valve which is factory set to relieve at 1800 psi. Also incorporated into the relief valve design is a positive indication feature which indicates that it has relieved. If the system reaches a pressure greater than the relief valve setting, the resulting release of product pushes the black relief valve indicator outside the relief valve body. This informs the system operator during his next system check that an over pressure condition has occurred. The indicator is reset by pushing it back into the relief valve body.

The rob valve is a YZ needle valve which is used to remove product from the accumulator vessel at the end of the sample period. This valve is normally closed.

The accumulator vessel isolation valve is used to isolate the accumulator vessel from the rest of the product carrying portion of the sampling system. This valve is normally open.

SECTION 6: MECHANICAL SYSTEM

Actuation/Mixing System (Pneumatic)

The function of the 80 psi instrument air supply is to provide an actuation power source for the sample pump and the accumulator vessel mixing system, refer to Apendix A, page 96. Constructed as an integral component of the entire sampling system, the entire system is pressure tested at the factory prior to shipment.

The instrument air source is internally connected to individual components within the sampler system. These split the pneumatic source between sample pump actuation and accumulator vessel mixing. The "actuation" leg is piped to a pressure regulator (factory set at 38 psi) and on to a three-way proof solenoid valve. This solenoid valve is normally closed and is mounted in the sample system enclosure. It is opened when energized by the sampler electronic control package. Opening the solenoid valve allows pneumatic pressure to actuate the sample pump. The actuation tubing to the Sample Pump from the solenoid connection must be field installed by the customer.

The "mixing" leg of the system is tubed directly to the inlet of the accumulator mixing valve. The inlet is located on the right side of the switch. The mixing switch is a three position switch, with the center position being the off position. When the mixing switch is moved to the up position, the mixing disc is moved up in the product accumulator. Moving the mixing switch to the down position causes the product accumulator mixing disc to move down in the product accumulator. The sample in the accumulator vessel is mixed by moving the mixing handle alternately up and then down. Four or fives passes through the sample should provide sufficient mixing.

SECTION 6: MECHANICAL SYSTEM

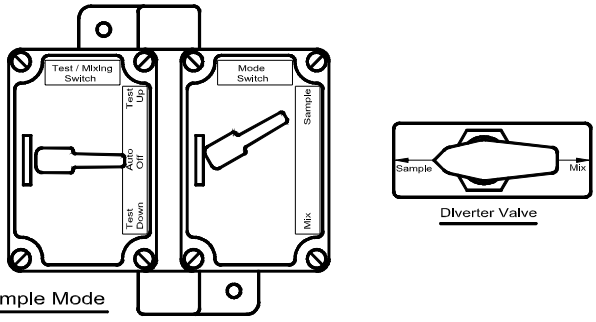
Actuation/Mixing System (Hydraulic)

The function of the hydraulic power pack is to provide a hydraulic actuation power source to the sample pump and the power mixing system on the product accumulator vessel, refer to Appendix A, page 99. The power pack is a unitized system that consists of a pump, motor, and four (4) quart reservoir. Mounted directly on the sample skid, the power pack is factory wired to the Mix/Mode switch, and the Counter. It is ready for wiring to the power supply and control function device (customer supplied). The Hydraulic Power Pack has been factory tested as an integral component of the entire sampling system, the power pack is filled with hydraulic fluid at the factory prior to shipment; however, after you install the sampler skid check the fluid level, and add additional fluid if required.

The oil level should be about 3/4" below the vent fitting on the oil reservoir. The system was originally filled with Phillips *MAGNUS "A"KV 5W-20* oil. This oil or equivalent should be used. If another type oil is desired, the entire system should be drained. Acceptable oils are clean hydraulic oil with a viscosity range of 150-300 SSU at 100° F. Recommended operating temperatures are 10° F to 165° F.

The power pack operates in one of two modes - the Sample mode or the Mix mode. In the Sample mode, the power pack actuates the sample pump when the electrical control device (customer supplied) determines it is time to take a sample. In the Mix mode, the power pack is used to move the mixing disc in the product accumulator vessel.

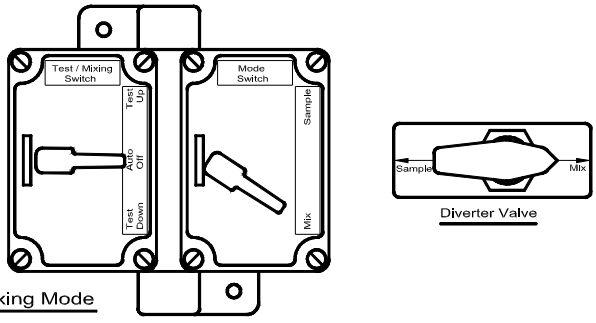
Control of the power pack is accomplished using a hydraulic fluid diverter valve, two electrical switches, and the Counter. The diverter valve is mounted on the discharge side of the power pack pump and has two positions-**Sample** and **Mix**. The electrical switches are located above the Hydraulic Power Pack. The switch on the right side is the mode switch and has two positions - "**Sample**" and "**Mix**". The switch on the left side is the Test/Mixing Switch and has three positions. The function of this three position switch is dependent upon the position of the mode switch and the diverter valve.



Sample Mode

In the SAMPLE MODE, the Diverter Valve should be in the SAMPLE position. Likewise, the mode switch should be in the SAMPLE position. This will enable the Test / Mixing switch to be used as a test switch to verify proper operation of the sample pump.

To verify the operation of the sample pump, move the Test / Mixing switch either up or down to test position and release.



Mixing Mode

In the MIXING MODE, the Diverter Valve should be in the MIX position. Likewise, the mode switch should be in the MIX position. This will enable the Test / Mixing switch to be used as a mixing switch. In this position, the mixing rod and disc can be moved up and down through the product stored in the sample vessel to insure a homogeneous mixture.

To mix product, move the Test / Mixing switch to the UP position. this will move the mixing disc up. Move the Test / Mixing switch to the DOWN position to move the mixing disc down.

SECTION 7: SYSTEM OPERATION
Preparing The System for Operation

Sample Pump Priming
Before the pump begins normal operation after initial installation or maintenance, the sample pump must be purged of all air in the sample chamber. The purge valve on the Sample Pump/Balance Valve, refer to Apendix A, pages 87-90, is used to evacuate the air from the chamber and to make sure the pump is liquid-packed. If the pump is not purged before being placed into operation, it will not function properly.

To purge the pump, open the purge valve located on the side of the Sample Pump/Balance Valve assembly. The product supply valve can then be opened to allow pipeline product to purge the air within the pump. Once product begins exiting the purge valve, close the purge valve. The sample pump is now ready to begin operation.

Product Line Test
Close the isolation valve located on the bottom of the Five-way Cross Assembly, refer to Apendix A, page 92. Stroke the sample pump until the system pressure reaches 1800 psi on the Five-Way Cross Assembly Gauge. The pressure should hold steady between pump strokes. Once the system is at 1800 psi, leak test all connections. Once the system has been tested, open the isolation valve located on the bottom of the Five-Way Cross Assembly.

Sample Vessel Connection
Connect a constant pressure portable sample vessel (DuraSite) to the rob valve located on the Five-way Cross Assembly, refer to Apendix A, page 92 using a short section of 1/8" or 1/4" stainless steel tubing. The portable sample vessel must also be precharged to 100-150 psi above the vapor pressure of the product, refer to page 72. Open the rob valve allow product into the DuraSite as the pump takes samples. Close the rob valve and remove the sample vessel from the rob valve, at the end of each sample cycle, and replace it with a clean empty vessel for the next cycle.

SECTION 7: SYSTEM OPERATION

DuraSite Sample Vessel Connection

Purpose: The DuraSite Portable Sample Vessel permits the user to remove a liquid or gas hydrocarbon sample from a pipeline or a sampling device. This is accomplished without changing the pressure of the product or exposing it to a contaminant fluid. If properly used and maintained the DuraSite will provide many years of safe, accurate and clean sampling.

Use: The DuraSite is a very safe device to use. As with any equipment dealing with flammable products, it is mandatory that a good, thorough operator training procedure be established prior to use.

Typical use of the cylinder would be as follows:

Step 1: (In The Lab) Connect a regulated inert gas supply to the pre-charge valve. The product valve should be open. By carefully controlling the pre-charge valve and the regulator, the cylinder can be slowly charged with pre-charge gas (NOTE: This should be done slowly to prevent slamming the piston down to the opposite end). The pressure on the pre-charge pressure gauge should be brought to a reading of 10-50 psi above the expected pressure of the product in the field . Close the pre-charge valve and disconnect the gas supply. Check the pre-charge valve, relief device, and the pre-charge pressure gauge for leaks. Any leaks should be stopped before continuing. The vessel should be placed in a padded carrying case and made ready for field use.

STEP 2: FOR COLLECTION OF SAMPLE FROM COMPOSITE ACCUMULATOR VESSEL.

2a: Connect the product end of the pre-charged sample vessel to the product supply. (Sampler product removal valve)
NOTE: the pre-charge pressure gauge reading should be greater than the product supply pressure reading. If not, repeat Step 1 above.

2b: Once the vessel is connected to the product supply, it is necessary to vent a small amount of product prior to filling the vessel. This assures fresh product and removes any air or gas when dealing with liquids. This can be done by loosening the product purge valve a very small amount until the product is purged. After thorough purging, the product purge valve should be tightened.

2c: The product pressure gauge reading should be 10-50 psi below the pre-charge pressure gauge reading. By carefully opening the pre-charge valve, the pressure becomes equalized, then begins to drop below the product pressure. The pre-charge valve should be carefully controlled so as to not vent the pre-charge gas too fast.

2d: When the cylinder becomes a maximum of 80% full (see volume indicator), all valves should be closed. The product connection is slowly broken in order to vent any trapped product. After vessel removal, all connections should be checked for leaks and the pre-charge and product valve ports capped to prevent leakage.

2e: Pack the DuraSite in appropriate carrying case to meet D.O.T. guideline, with D.O.T. paperwork and transport to lab for analysis.

Step 3: (In The Lab) Prior to analysis, the product should be mixed. This is accomplished simply and efficiently by inverting the cylinder end-over-end, causing the mixing ball to fall through the product. Approximately 10-12 trips of the mixing ball through the product assures a homogenous solution.

Step 4: The regulated pre-charge gas should be reconnected to the pre-charge side of the cylinder. The pre-charge gas supply should remain open during analysis.

Step 5: Purging a small amount of product from the vessel removes unmixed product from the tee, relief device, gauge, etc. The unit can now be connected to a chromatograph and the product analyzed.

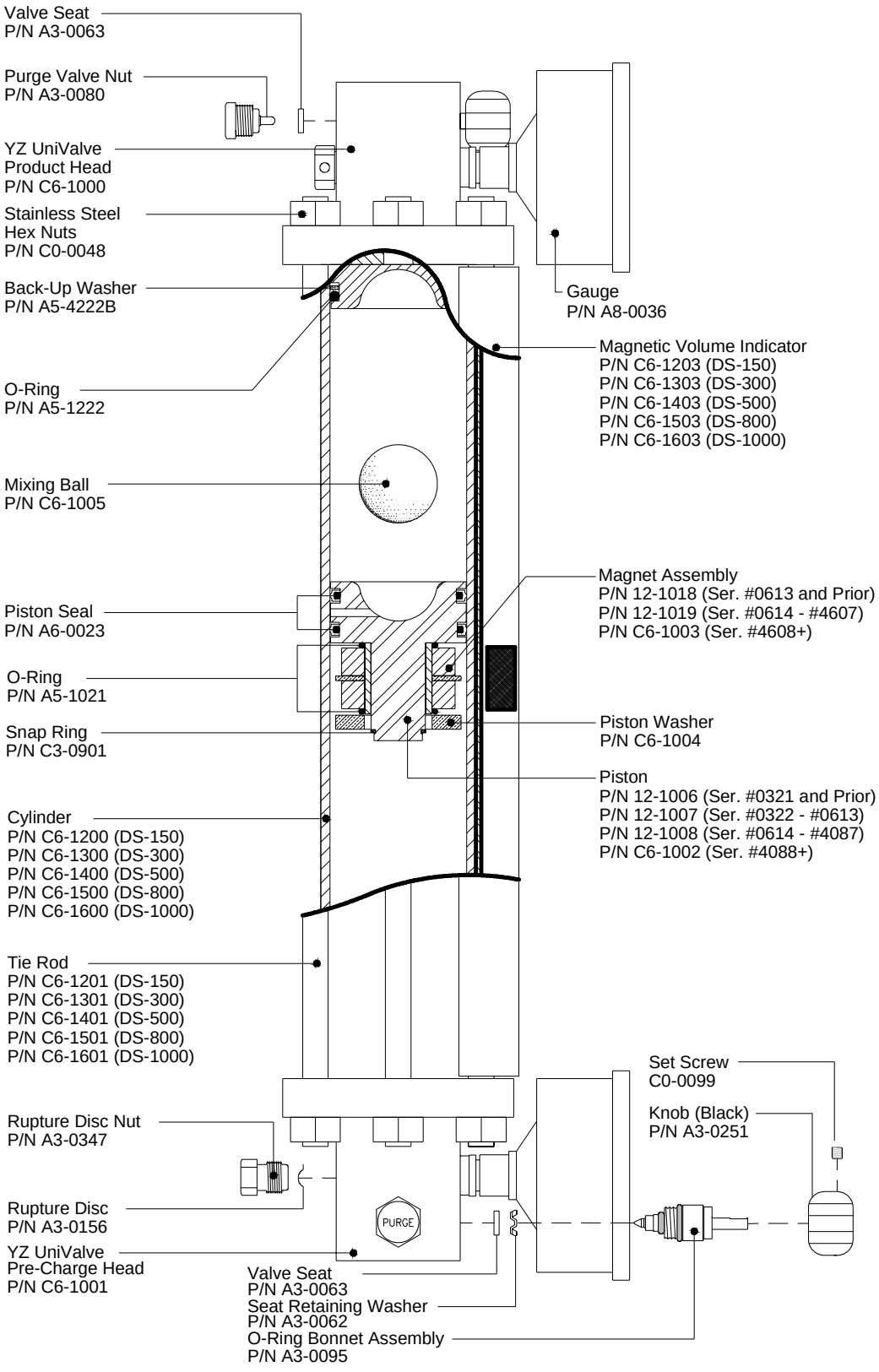
Step 6: After analyzing, the remainder of the product should be dumped and the vessel properly cleaned. Normal cleaning can be accomplished by rinsing the product end with a petroleum solvent and flushing with acetone. If a more thorough cleaning is required, the vessel should be disassembled.

WARNING: A portable sample vessel should never be filled to more than 80%. This allows a 20% pre-charge cushion to absorb thermal expansion of the product.

Shipping: Extreme care should be taken when preparing a vessel for shipment. Both valves should be capped to prevent possible leakage. The vessel should be placed in a snug-fitting, well-padded and durable case. All applicable DOT regulations should be adhered to.

SECTION 7: SYSTEM OPERATION

figure 70



Notes

SECTION 8: SYSTEM MAINTENANCE

Preventative Maintenance Schedule

A preventative maintenance program serves to anticipate maintenance issues prior to waiting until the system requires service. Like changing the oil & filters in an automobile, by choosing to service the various parts and operation in the Sampling System at regular intervals, the technician can perform the maintenance service when desired, rather than when required, such as in the middle of night.

The key is to perform maintenance before it is required. The preventative maintenance schedule implemented should consider the application of the sampler. Many of these considerations include: the weather environment; the condition of, the actuation gas, the product condition and quality, and the pump stroke frequency. All of these issues must be considered when establishing a preventative maintenance schedule.

Recommended Maintenance Schedule Monthly Inspection

1. Verify system pressures
2. Check for leaks

Annual Inspection

1. Rebuild pump
2. Clean and service the pneumatic mixing valve if so equipped
4. Test the relief valve and service, as needed
5. Test regulators and service, as needed
6. Test the Light Liquid Sampler System performance

Bi-Annual Inspection

1. Perform the annual inspection listed above
2. Replace solenoid if so equipped
3. Rebuild Accumulator Vessel

Recommended Spare Parts List

Part #	Description	Recommended Quantity
D3-0152	PNR-2P/LPR-2P pump seal replacement kit	1
	OR	
D3-0153	PNR-2H/LPR-2H pump seal replacement kit	1
D3-0139	Balance Valve Repair Kit	1

Notes

SECTION 9: SYSTEM TROUBLESHOOTING - PNEUMATIC SYSTEMS

How to Use This Section

The recommendations contained in this section should be used as a preliminary information resource to remedy operational issues with the PNR-2P Sampling System. It is important to read all of the definitions and notes prior to initiating work.

Each subsection contains a description of the indicators followed by a step-by-step trouble shooting procedure.

For Additional Help

Any issue that can not be resolved through the use of this reference, please contact YZ Technical Service at:

T: 1.800.653.9435
T: 1.281.362.6500, International Calls
F: 1.281.362.6513
Em: Service@yzhq.com

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

- Take special care when disconnecting any fitting, to assure that product and/or pressure will not be released when the connection is broken. This system may contain liquid and/or gas at high pressures.

Step-by-Step Resolution

Using a step-by-step method to resolve issues on the Sampling System will reduce maintenance time and assist in returning the system to service quicker.

The following represent the recommended chronology to resolve issues:

Resolve issues to the following order:

a. *Actuation Gas Pressure*, *page 77*
b. *Electrical Power*, *page 78*
c. *Sample Pulse,* *page 79*
d. *Pump Performance,* *page 79*
e. *Pre-Charge Pressure /Product Accumulator Vessel ,* *page 80*

Actuation Gas Pressure

This section should be used to troubleshoot sampler performance, when the Sample Pump will not actuate, and/or when the pneumatic power mixing system on the Accumulator Vessel will not function.

Actuation Gas Troubleshooting Steps

1. Verify the supply gas valves, and regulators supplying gas to the sampler system are properly functioning, and adjusted.

2. Disconnect the Pneumatic Supply connection at the top of the Sample Pump.

   a. There should NOT be any gas pressure present. Gas pressure should be present for ONLY 3 seconds each time a sample pulse is received by the sample systems from the flow monitoring device, that signals the sampler when to take a sample.

   b. Initiate a sample with the flow monitoring device pulse, and observe to see if a 3 second burst of gas is expelled from the connection loosened in step 2 above.

c. If a 3 second burst of gas is expelled from the connection loosened in step 2, the actuation system to the pump is functioning properly. Reconnect the Pneumatic Supply connection to the top of the Sample Pump. Proceed to pump performance trouble-shooting, if the problem seems to be with your pump, or proceed to step 3, if you are having difficulties with the power mixing of your sample system.

3. Disconnect the tubing at the top of the Actuator Head of the Product Accumulator vessel. There should not be any pressure there until the Mixing Valve is placed in the down mixing position.

   a. If gas is flowing continually when this line is disconnected, the Mixing Valve should be repaired, or replaced.

   b. If gas does not flow to the loosened connection when the Mixing Valve is actuated to the down position, try moving the valve to the up position, and see if you get gas flow at the loosened connection. If you still have no gas flow to the loosened connection, the Mixing Valve should be repaired, or replaced.

   c. If gas does flow properly, to the loosened connection, when the Mixing Valve is placed in the down mixing position, check the vent/muffler on the Mixing Valve to see if it may be stopped up. Clean or replace the vent/muffler as re quired.

Electrical Power

IMPORTANT NOTE:

All electronics are housed in explosion proof enclosures and are rated for use in Class I, Division 1, Groups C and D hazardous locations.

The power supply to the sampler must be properly connected and supplying power to the sample system, before it can be expected to perform. Often electrical storms, or other electrical surges that occur at the sampler site may cause interruption of the power supply to the sampler. The power is used to drive the solenoid for a duration of 3 seconds each time a sample is called for by the flow monitoring device connected to the sampler system. Electrical power troubleshooting will include steps to assure the power is actually getting to the solenoid for the required duration, and that the solenoid is activating the sample pump. The typical symptom to lead a technician to this step would be that the sample pump is not being actuated when a pulse from the flow monitoring device sends a dry contact sample pulse to the sampler.

Electrical Power Troubleshooting Steps

CAUTION:

Prior to opening the electrical enclosure be sure to disconnect all power and pulse connections at the safe end of wiring or perform test to assure the area of the enclosure is safe to open the enclosure.

1. Verify the power is actually reaching the counter in the Sample System electrical enclosure. Test for continuous power at the counter by connecting your Voltmeter to the counter terminal pins, refer System Control and Electronics in Section 4.

Sample Pulse

IMPORTANT NOTE:
All electronics are housed in explosion proof enclosures and are rated for use in Class I, Division 1, Groups C and D hazardous locations.

The Sample Pulse to the sampler must be properly connected and supplying power to the pneumatic solenoid, before the sampler system can be expected to perform. Often electrical storms, or other electrical surges that occur at the sampler site may cause interruption of the Sample Pulse to the sampler. The pulse power is used to drive the solenoid for a duration of 3 seconds each time a sample is called for by the flow monitoring device connected to the sampler system. Sample Pulse troubleshooting will include steps to assure the power is actually getting to the solenoid for the required duration, and that the solenoid is activating the sample pump. The typical symptom to lead a technician to this step would be that the sample pump is not being actuated when a pulse from the flow monitoring device sends a Sample Pulse signal to the sampler. The origin of this Sample Pulse is in the flow monitoring equipment, that is not actually a part of the sampler system; therefore troubleshooting will be limited to verifying that the sampler system does respond properly when an appropriate pulse is generated.

Sample Pulse Troubleshooting Steps

CAUTION:
Prior to opening the electrical enclosure be sure to disconnect all power and pulse connections at the safe end of wiring or perform test to assure the area of the enclosure is safe to open the enclosure. These connections carry power supply voltage.

1. Verify the power is actually reaching the Solenoid on the Sample Skid.

   a. Test for power at the solenoid connection by connecting your Voltmeter to the solenoid wires.

   b. If there is not power at the solenoid for 3 seconds when a sample signal is being sent to the sampler system by the flow monitoring device, check the breaker, and wiring back to the flow monitoring device. Repair any loose or broken wires, reset or replace circuit breaker as required.

2. If step 1 above does not resolve your problem, proceed to troubleshooting the output from your flow monitoring device.

Pump Performance

There are many factors that affect pump performance. Some are within the pump, while others are outside factors that affect pump performance.

Pump Performance Troubleshooting Steps

1. Actual performance of the Actuation Gas, and Electrical Power issues should have already been dealt with, If not , perform those troubleshooting steps before proceeding to step 2.

2. Close the isolation valve located on the bottom of the Five-way Cross Assembly. Stroke the sample pump while observing the pressure reading on the Five-way Cross Assembly Gauge. The system pressure should steadily build to 1800 psi . The pressure should hold steady between pump strokes. Once the system is at 1800 psi, leak test all connections. Once the system has been tested, open the isolation valve located on the bottom of the Five-way Cross Assembly. Completion of this test verifies the pump performance is O.K.

3. The next step, if the pump did not pass the test in step 2, is to verify that the pump is fully liquid packed with liquid product to be pumped. The Sample Pump must be purged of all air in the sample chamber, before it can pump liquid product. The purge valve on the sample pump is used to evacuate the air from the chamber and to make sure the pump is liquid-packed. If the pump is not purged properly, it will not function properly.

   a. Open the purge valve located on the left side of the sample pump.

   b. Next open the product supply valve to allow pipeline product to purge the air within the pump.

   c. Once product begins exiting the purge valve, close the purge valve. The sample pump is now ready to begin operation. Perform pump test #2 again. If your product is not consistently in a single phase liquid state the pump will vapor lock again, and repriming will be necessary, repeatedly, till the phase condition of the product is resolved.

4. If during the pump troubleshooting step 2, you observed the pressure on the Five-way Cross Assembly Gauge jumping from pipeline pressure to a higher pressure, during the pump stroke, but immediately returning to pipeline pressure after the stroke, the Balance Valve Assembly should be rebuilt using a YZ Repair Kit P/N D3-0139.

5. If during the pump troubleshooting step 2, you observed the pressure on the Five-way Cross Assembly Gauge build steadily to pipeline pressure, then stop building at pipeline pressure, the Sample Pump inlet check is not holding. Typically installing a YZ Repair Kit P/N D3-0152, will resolve this situation.

Pre-Charge/ Product Accumulator

The Product Accumulator works in conjunction with the Pre-Charge Vessel to maintain the integrity of captured sample in the sampler system. The Product Accumulator Vessel may be repaired on site, but requires some special tools to do so, and it is recommended that if this vessel needs service, you should contact YZ - Milton Roy Technical Service @ 1.281-362-6500 to obtain a Return Authorization Number to return the Product Accumulator Vessel to YZ for reconditioning. The pre-charge vessel pressure must remain at a pressure that exceeds the critical vapor pressure of the product being sampled. A typical pressure setting should be 100 PSI over the pipeline pressure.

Pre-Charge/Product Accumulator Troubleshooting Steps

1. If the charge in the vessel is low, recharge it to the proper pressure, by connecting an external source of inert gas to the Pre-Charge Isolation Valve, and open the valve until the Pre-Charge Vessel pressure is once again at the desired pressure.

2. Close the Pre-Charge Isolation Valve.

3. Disconnect the external source of inert gas.

4. Wrap a 1/4” MNPT plug with TFE tape, and install it in the Pre-Charge Isolation Valve.

5. Use liquid soap to leak test all connections on the Pre-Charge Vessel, Pre-Charge Isolation Valve, Tubing to the Accumulator Vessel, and Pre-Charge connection to the Accumulator Vessel. Fix any leak detected.

6. If no leaks were found in step 5, look at the most recent analysis report on product taken from this sampler, to see if an abnormal amount of inert gas of the type used for Pre-Charge was present in the sample. If Pre-Charge gas is found in the sample, contact YZ - Milton Roy Technical Service @ 1.281-362-6500 to obtain a Return Authorization Number to return the Sample Accumulator Vessel to YZ for reconditioning.

How to Use This Section

The recommendations contained in this section should be used as a preliminary information resource to remedy operational issues with the LPR-2H Sampling System. It is important to read all of the definitions and notes prior to initiating work.

Each subsection contains a description of the indicators followed by a step-by-step trouble shooting procedure.

For Additional Help

Any issue that can not be resolved through the use of this reference, please contact YZ Technical Service at:

T: 1.800.653.9435
T: 1.281.362.6500, International Calls
F: 1.281.362.6513
Em: Service@yzhq.com

SAFETY NOTES

- Always use extreme care when performing maintenance on Sampling Systems. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

- Take special care when disconnecting any fitting, to assure that product and/or pressure will not be released when the connection is broken. This system may contain liquid and/or gas at high pressures.

Step-by-Step Resolution

Using a step-by-step method to resolve issues on the Sampling System will reduce maintenance time and assist in returning the system to service quicker.

The following represent the recommended chronology to resolve issues:

Resolve issues to the following order:

a. *Electrical Power*, *page 81*
b. *Hydraulic Power*, *page 83*

Electrical Power

CAUTION:

Prior to opening the electrical enclosure be sure to disconnect all power and pulse connections at the safe end of wiring or perform test to assure the area of the enclosure is safe to open the enclosure.

The 120 VAC power supply to the sampler must be properly connected and supplying power (120 VAC @ 20 amps) to the sample system, before it can be expected to perform. Often electrical storms, or other electrical surges that occur at the sampler site may cause interruption of the power supply to the sampler. The power is used to drive the Hydraulic Power Pack for a minimum duration of 3 seconds each time a sample is called for by the counter when the programmed number of pulses has been counted as provided by a flow monitoring device connected to the sampler system, and to run the power pack longer during the sample mixing mode of operation. Electrical power troubleshooting will include steps to assure the 120 VAC power is actually getting to the Power Pack for the required duration. The typical symptom to lead a technician to this step would be that the sample pump is not being actuated when a pulse from the flow monitoring device sends a sample pulse to the sampler.

Electrical Power Troubleshooting Steps

CAUTION:

Prior to opening the electrical enclosure be sure to disconnect all power and pulse connections at the safe end of wiring or perform test to assure the area of the enclosure is safe to open the enclosure.

1. Verify the 120VAC power is actually reaching the Hydraulic Power Pack, and Control System. (The power to the Hydraulic Power Pack is directly connected to the Control System power connection; therefore if power is getting to the Control System, it should be getting to the Hydraulic Power Pack).

    a. Test for continuous 120 VAC to the Hydraulic Power Pack/counter, by connecting your AC Voltmeter to the Neutral and Hot 120 VAC wiring connections to the Test Switch, refer to Appendix A Electrical Wiring, Hydraulic Power Pack/Test Switch, Page 102.

    b. If there is not 120VAC continuous power to the Test Switch, check the breaker, and AC wiring back to the AC source. Repair any loose or broken wires, reset or replace circuit breaker as required.

Sample Pulse

1. The next Electrical Power test is to see if the Control System functions properly when a dry contact pulse is applied. Set the counter to 1, if your control System has a totalizing counter.

    a. Once continuous 120 VAC power is verified at the Control System, (step #1 above); Connect your AC Voltmeter to the TDR Input Pulsed 120 VAC wiring connection, and the 120 VAC Neutral wiring connection, refer to Appendix A Electrical Wiring, Hydraulic Power Pack/Test Switch, Page 102. This should be a pulsed 120 VAC with a 3 second duration ONLY when the Control System is activated, by the dry contact pulse from your flow monitoring equipment.

    b. If the flow monitoring device can not be utilized to send a test pulse at this time, you may be able to create a test pulse.

CAUTION:

These connections carry 120 VAC power.

    Connect a normally open switch that is capable of creating a dry contact closure, and rated for the voltage present, to the Dry Contact connections for your Control System, refer System Control and Electronics in Section 4. Close the switch momentarily, while your AC voltmeter is connected as in troubleshooting step 2a.

3. The next electrical power test has to do with the dwell time of the counter. If the test #1 and #2 have not resolved your problem, the delay capasitor on the Control System may have been damaged. The capasitor is connected to pins on the Control System, refer System Control and Electronics in Section 4.

4. The final step in troubleshooting the electrical power for the sampler, would be to replace the counter or Hydraulic Power Pack itself. They are available from YZ - Milton Roy.

Hydraulic Power

Hydraulic power is measured in terms of hydraulic pressure. There are several factors that may cause your systems to not provide sufficient hydraulic pressure, as outlined below.

CAUTION:

The Hydraulic Power Pack should NEVER be operated without recommended oil in the reservoir. Do not operate the Power Pack at temperatures over 140 F., or less than 0 F.

Hydraulic Power Troubleshooting Steps

1. Verify the Hydraulic Power Pack is properly filled with the oil.

   a. Remove the oil reservoir Filler/Breather Cap.

   b. Check the oil level. It should be approximately 1" below the lip of the oil reservoir.

   c. If additional oil is required add oil of a similar type as has been previously installed in the Hydraulic Power Pack.

IMPORTANT NOTE:

Oil type should be *10 WT. Phillips Magna-A* hydraulic oil, automatic transmission fluid, or any clean hydraulic oil with a viscosity range of 150-300 SSU @ 100 F.

2. If the hydraulic system begins making an unusual screeching noise, and the oil level is correct, check and clean, or replace the reservoir filter.

   a. Drain the oil from the oil reservoir, utilizing the oil drain plug at the lower end on the oil reservoir, opposite the power pack electrical motor.

   b. Remove the (4) hex head cap screws that hold the oil reservoir to the Power Pack coupler housing, and slide the reservoir off.

   b. Examine, clean, and/or replace the filter on the end of the oil pump suction pipe.

3. Verify hydraulic power system pressure. This may be done in two ways, as detailed below.

   a. Pressure Test Method #1:
   - Disconnect the pressure out line from the Hydraulic Power Pack, refer to illustration, page 100.
   - Install a pressure gage into the pressure out port from the Power Pack.

CAUTION:

The use a high quality gage capable of with standing at least 1,000 psi of pressure.

   - Test run the Power Pack, and observe the dead headed pressure on the gage. Pressure should be between 350 psi - 400 psi.
   - If the pressure is not sufficient contact YZ - Milton Roy
   - Remove the gage, and reconnect the original tubing to the Sample Pump.
   - This is a bidirectional Power Pack, so now repeat the process with the pump running the other direction, and with the gage in the other port from the Power Pack.

   b. Pressure Test Method #2:
   - Disconnect the pressure in line to the Sample Pump, from the Hydraulic Power Pack, refer to illustration, page 100.
   - Install an inline Tee, with a pressure gage into the pressure in port of the Sample Pump, and re-connect the tubing from the Power Pack.

CAUTION:

Use a high quality gage capable of with standing at least 1,000 psi of pressure.

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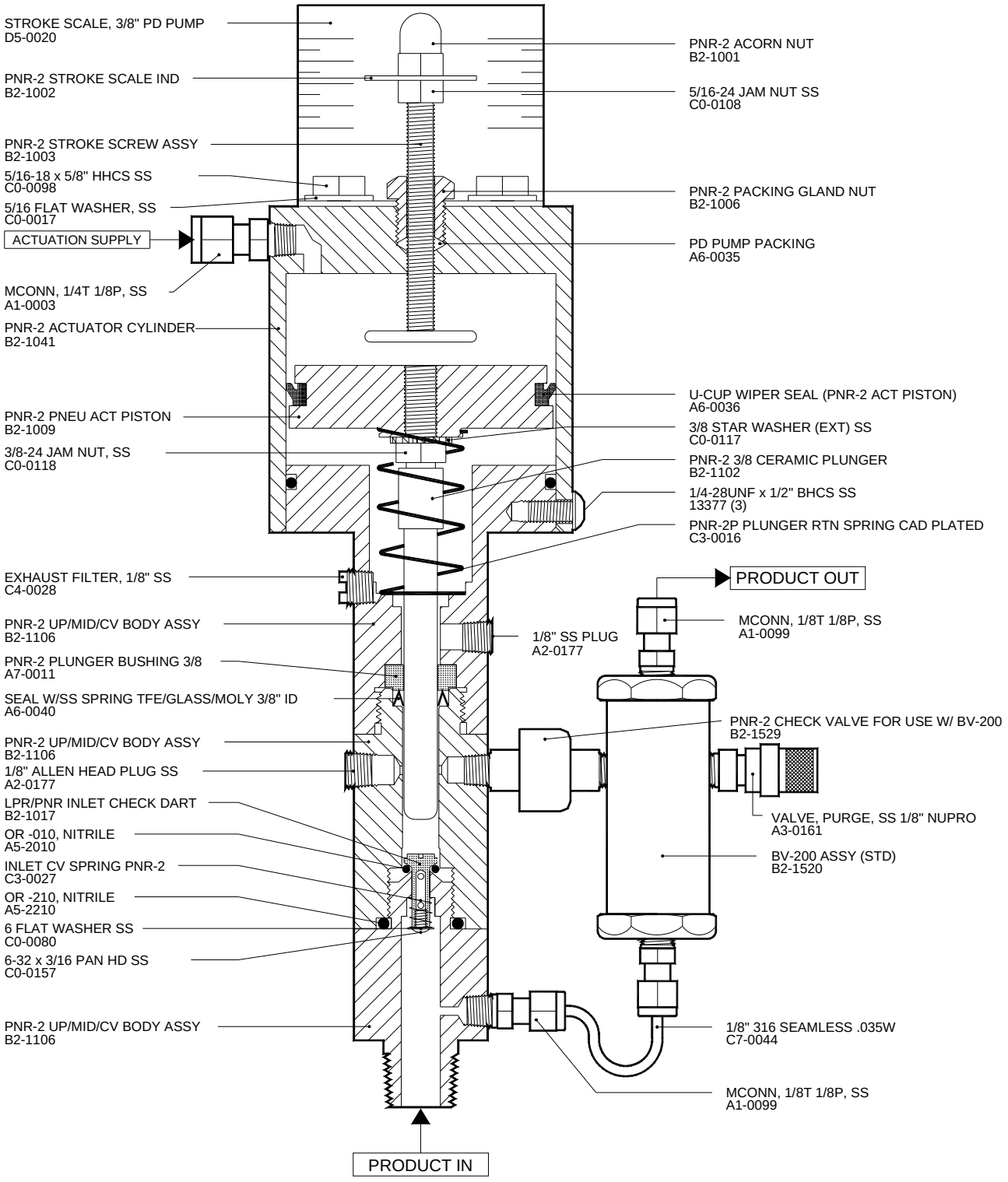
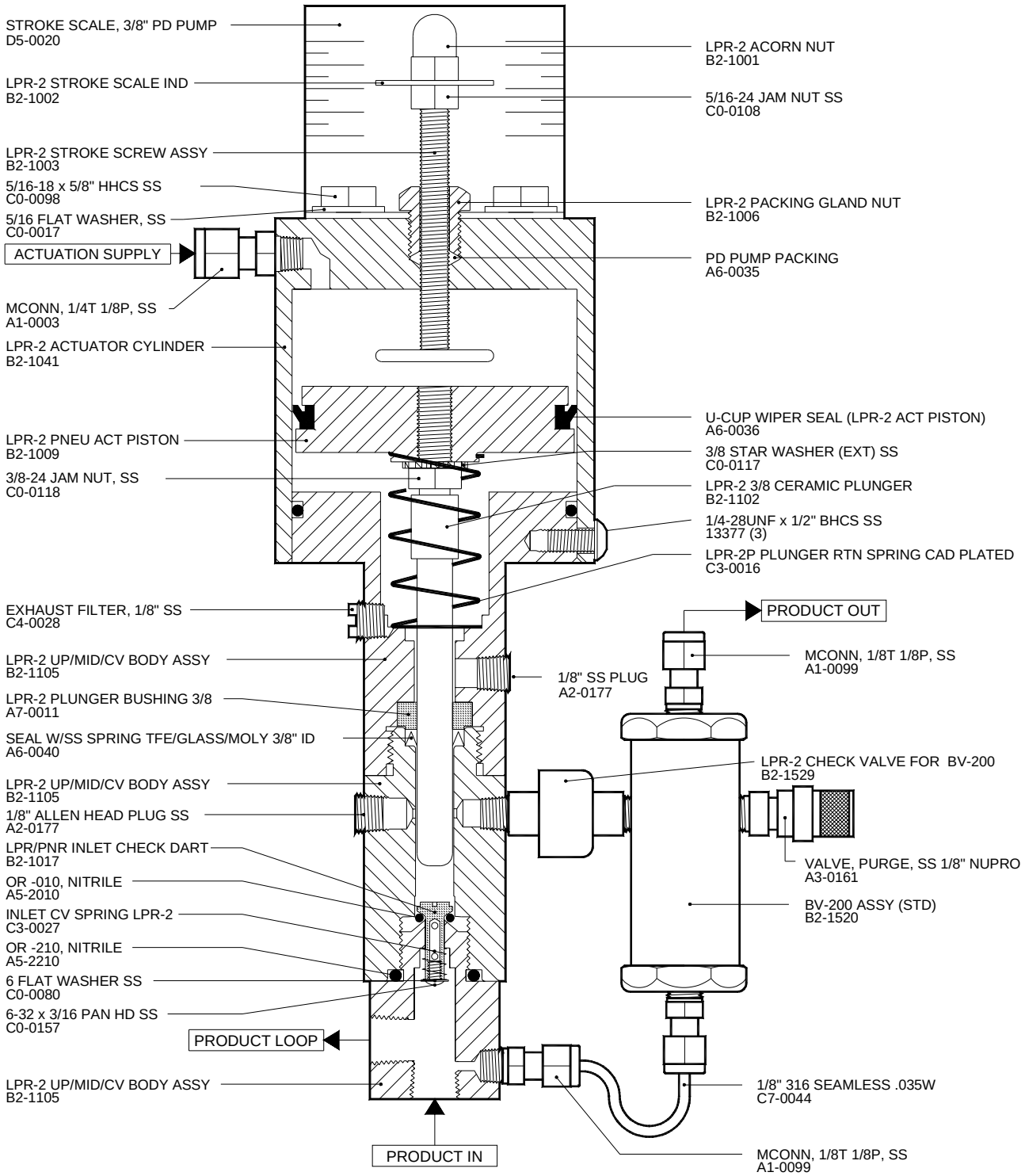
PNR-2P Sample Pump, Assembled

Figure 71



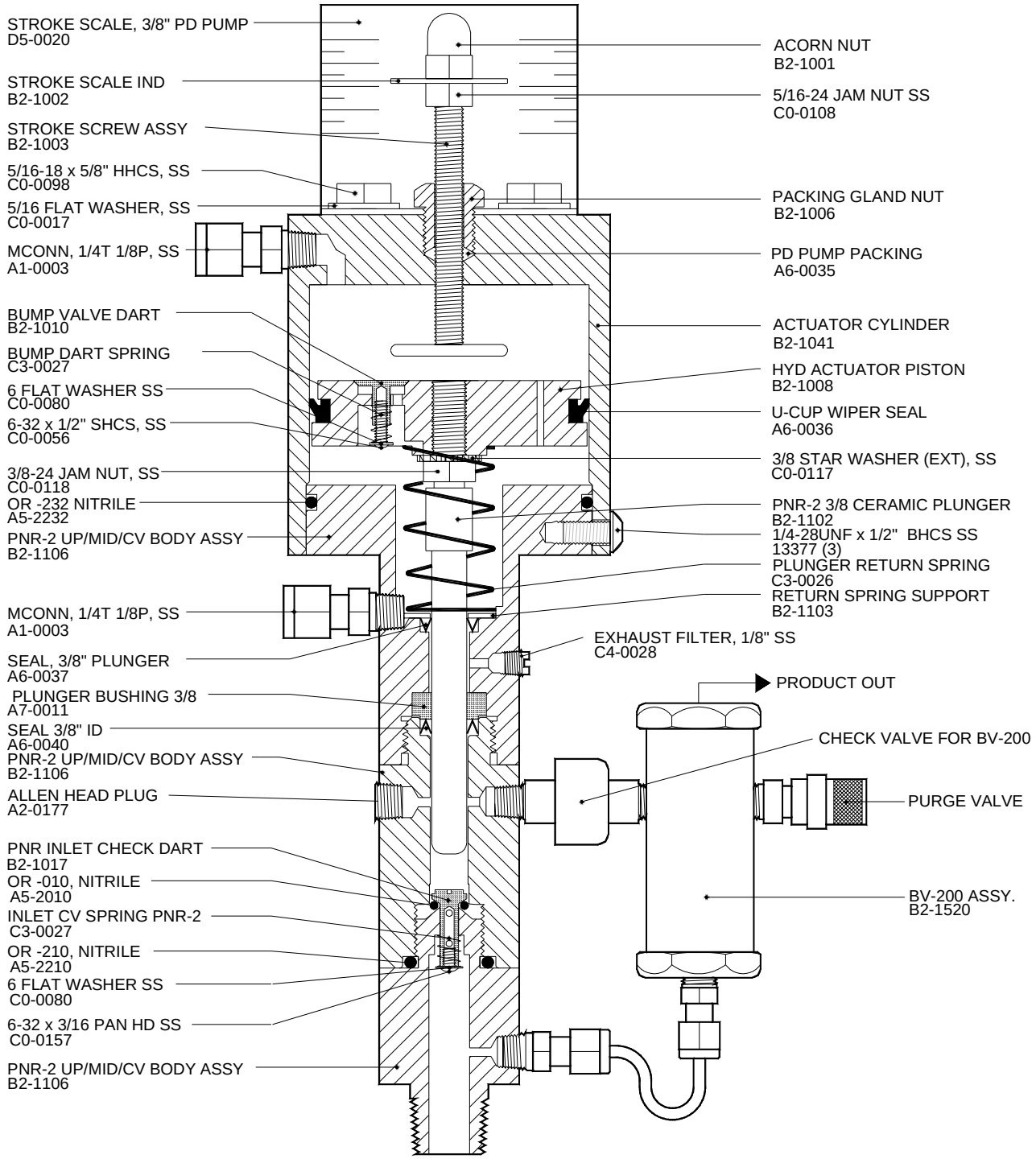
LPR-2P Sample Pump, Assembled

Figure 72



PNR-2H Sample Pump, Assembled

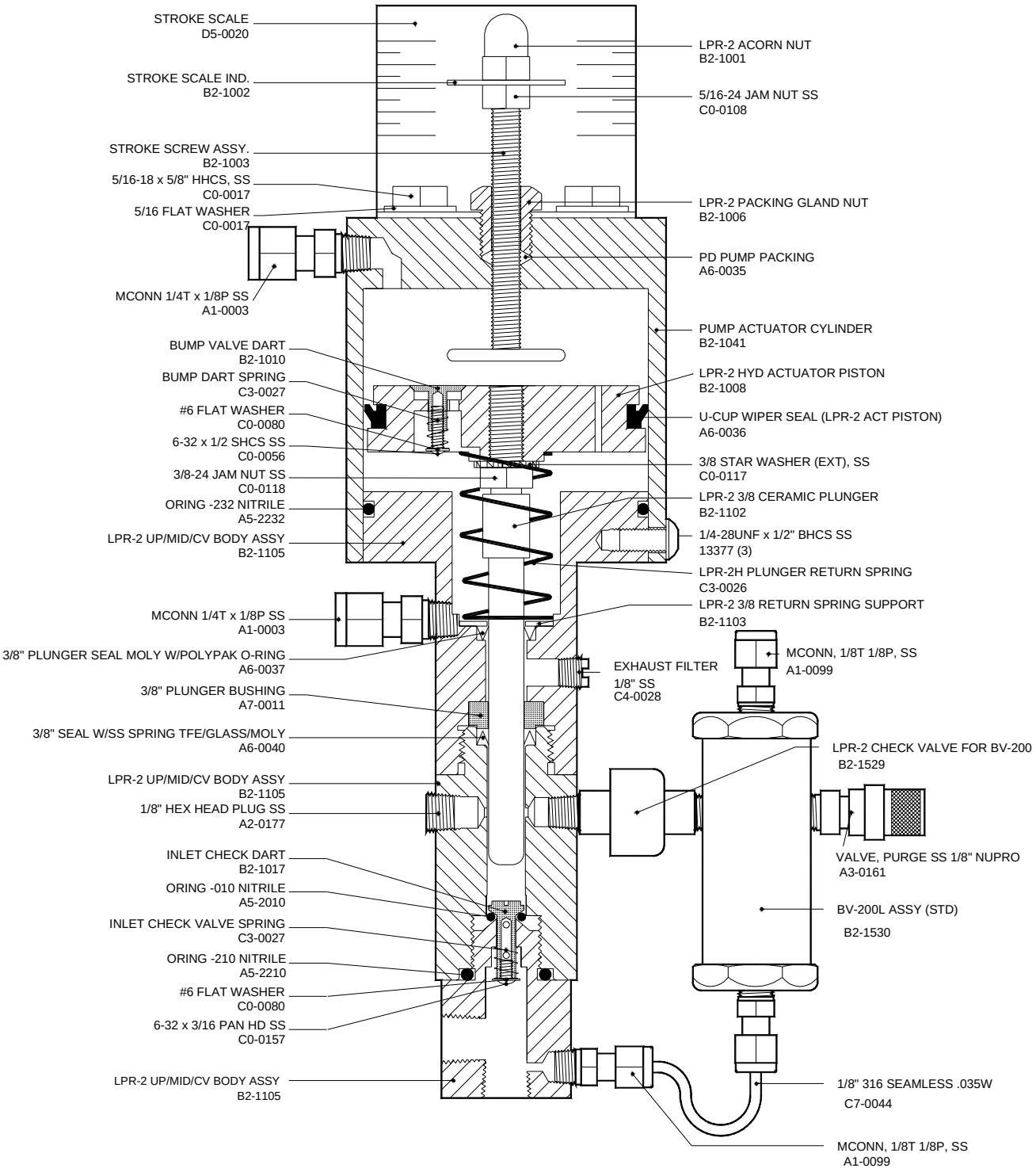
Figure 73



APPENDIX A: ILLUSTRATIONS

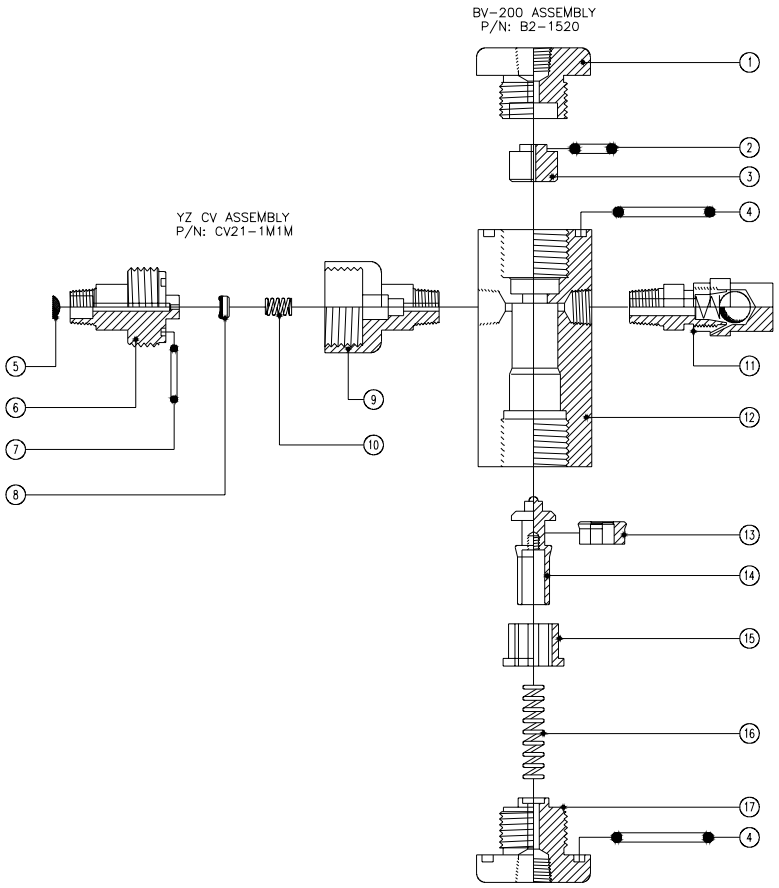
LPR-2H Sample Pump, Assembled

Figure 74



Balance Valve, Exploded View

Figure 75

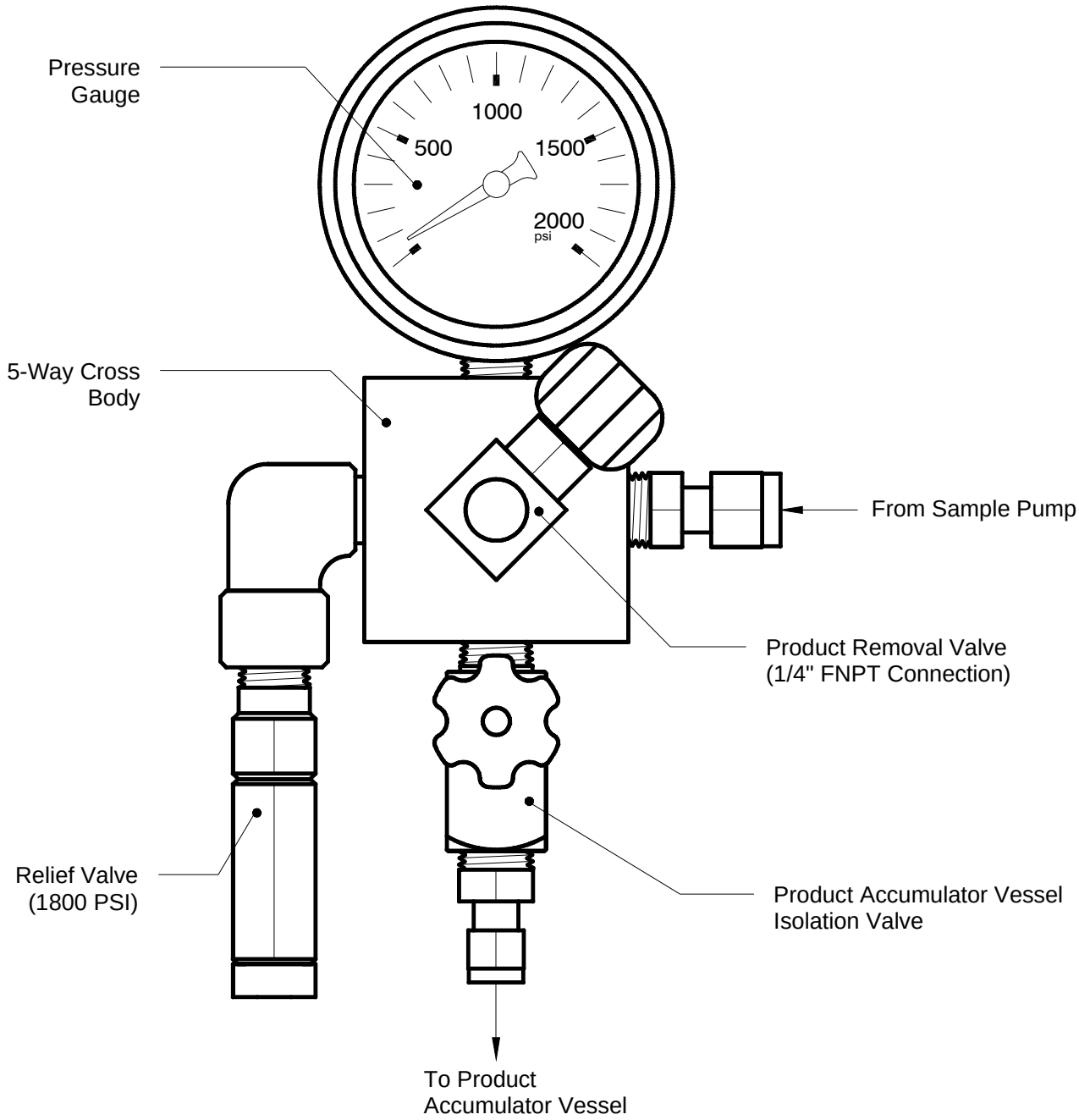


BILL OF MATERIALS			
REF.	PART NO.	DESCRIPTION	QTY.
1	B2-1514	BV-200 UPPER HEAD	1
2	A5-2109	OR -109 NITRILE	1
3	B2-1518	BV-200 DART STOP (STD)	1
4	A5-2119	OR -119 NITRILE	2
5	C4-0027	BALANCE VALVE FILTER SCREEN	1
6	A3-2200	YZ CV 1/8MNPT 1/4W INLET FOR CV2X-1MXX MODELS	1
7	A5-2014	OR -014 NITRILE	1
8	B0-1021	1/4" VITON WAFER	1
9	A3-2204	YZ CV 1/8MNPT 1/4W OUTLET FOR CV2X-1MXX MODELS	1
10	C3-0037	SPRING, DCV, 6000 PUMP	1
11	A3-0161	VALVE, PURGE, SS 1/8"	1
12	B2-1516	BV-200 BODY	1
13	A6-0092	B/V 200 SEAL 1/4 x 1/2	1
14	B2-1519	BV-200 DART (STD)	1
15	B2-1517	BV-200 BUSHING GUIDE	1
16	C3-0047	BV-200 SPRING	1
17	B2-1515	BV-200 LOWER HEAD	1

APPENDIX A: ILLUSTRATIONS

5-Way Cross Assembly,

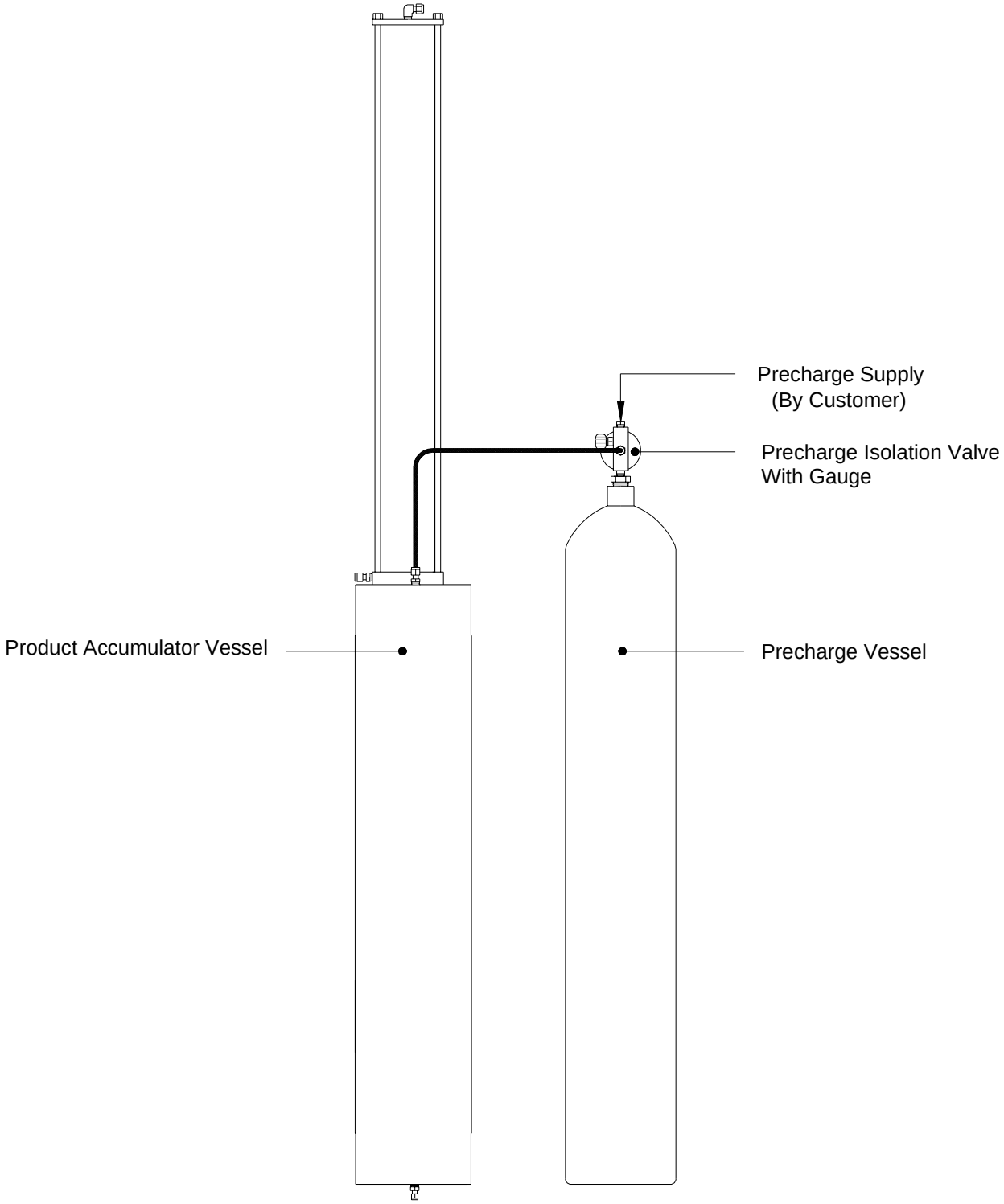
Figure 76



APPENDIX A: ILLUSTRATIONS

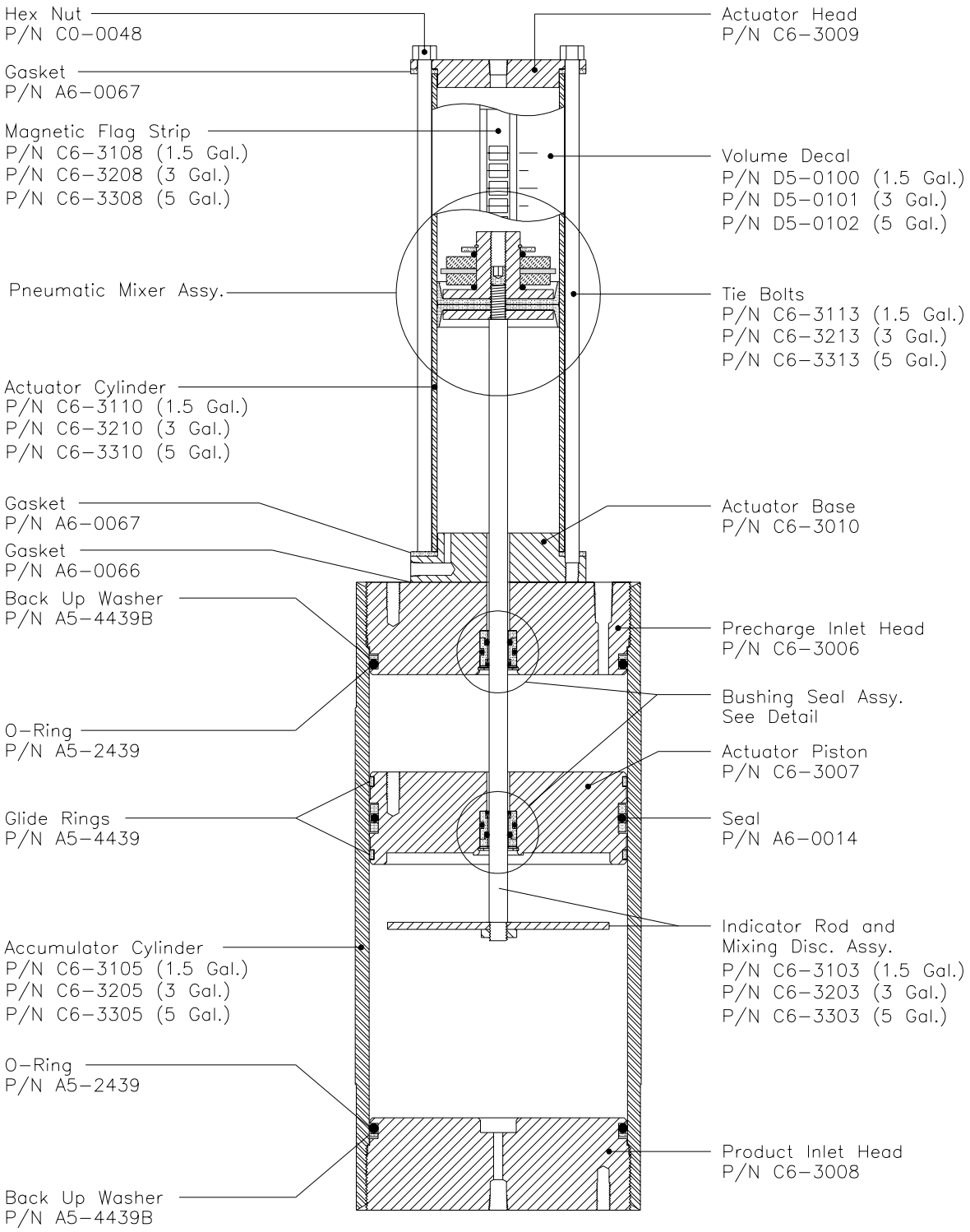
Pre-Charge Assembly,

Figure 77



Pneumatic Mixed Accumulator Vessel,

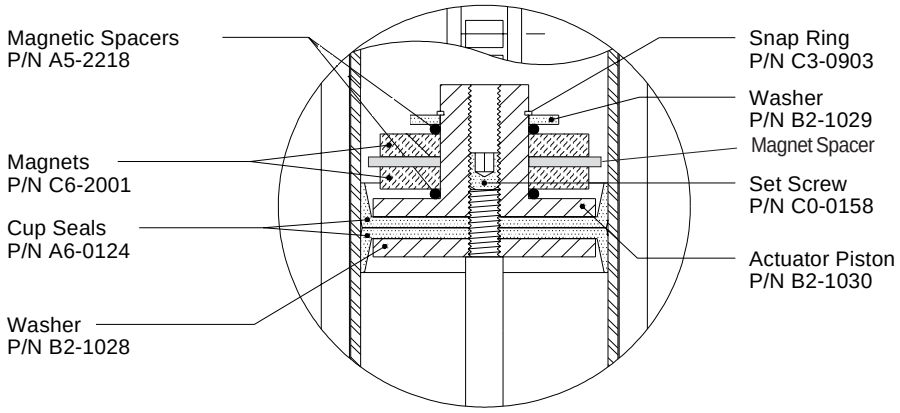
Figure 78



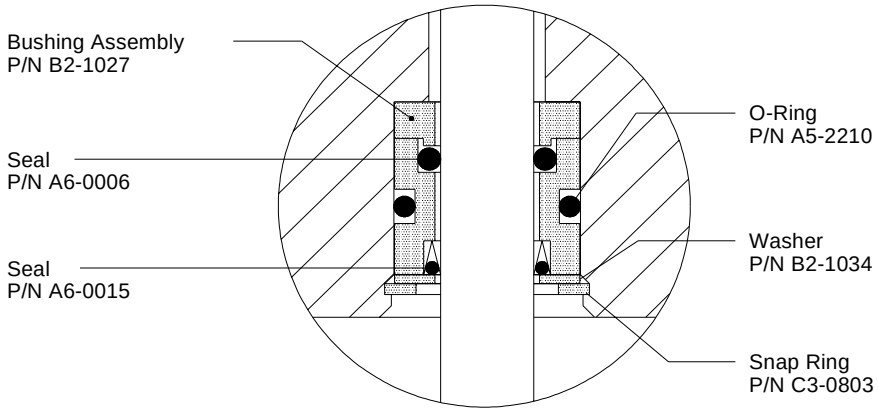
APPENDIX A: ILLUSTRATIONS

Pneumatic Mixing System-Accumulator,

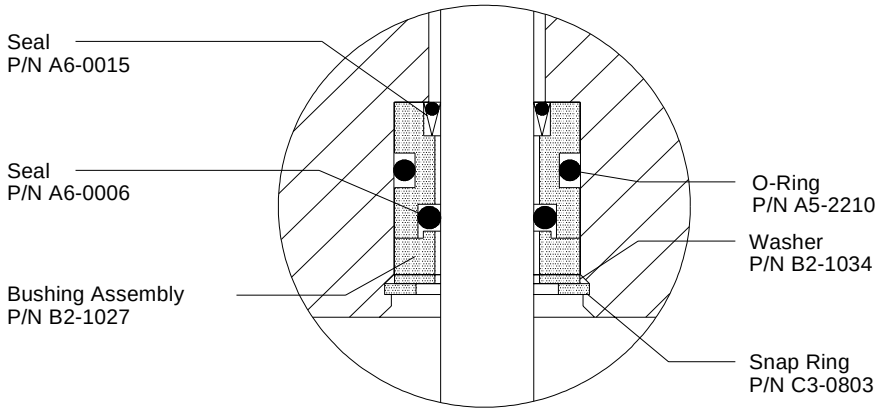
Figure 79



Pneumatic Mixer
Piston Assembly



Bushing Seal Assembly for
Precharge Inlet Head

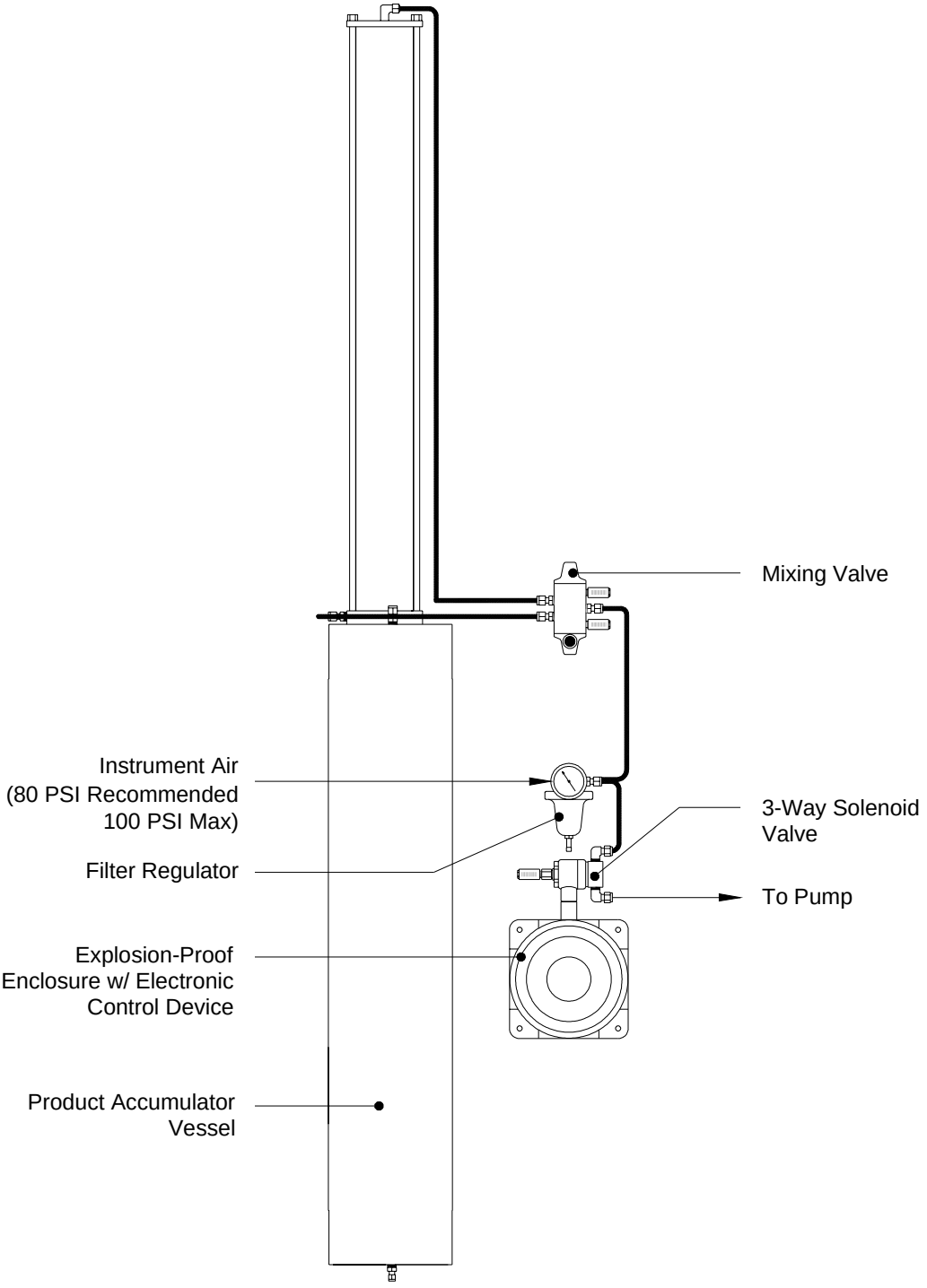


Bushing Seal Assembly for
Actuator Piston

APPENDIX A: ILLUSTRATIONS

Mixing System

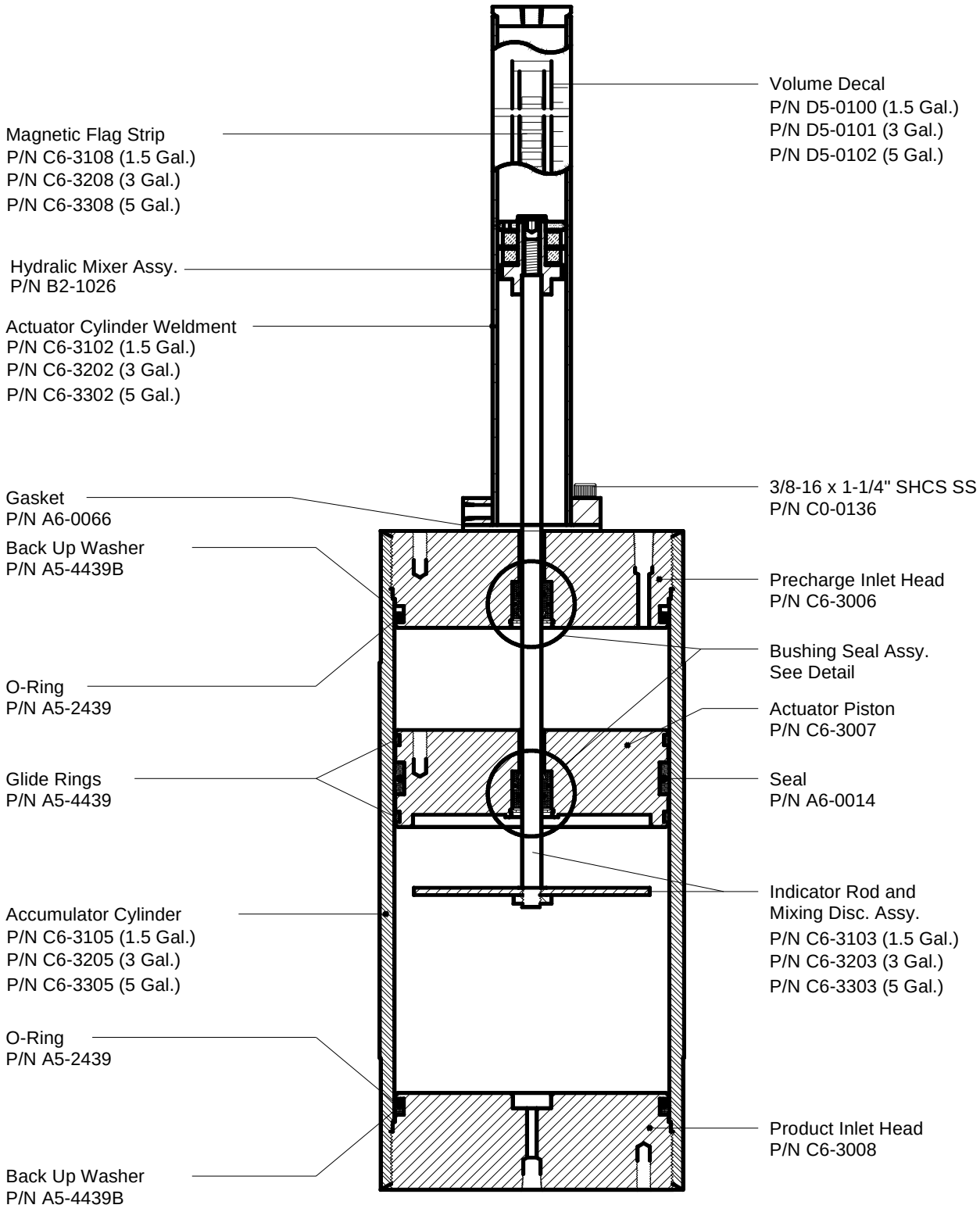
Figure 80



APPENDIX A: ILLUSTRATIONS

Hydraulic Mixed Accumulator Vessel,

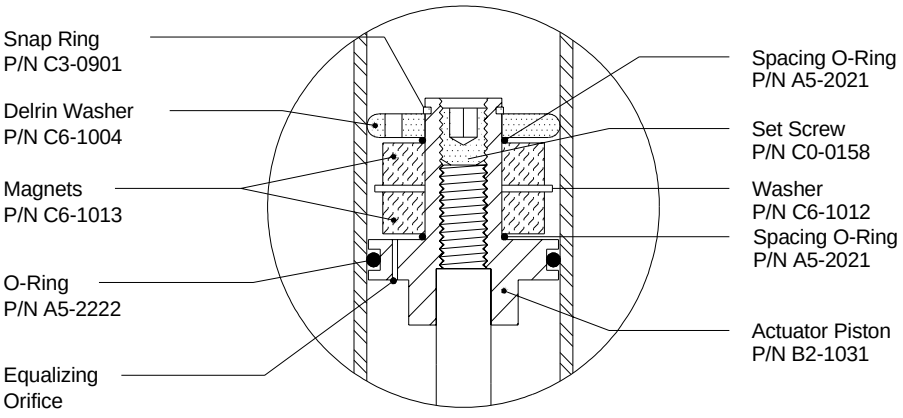
Figure 81



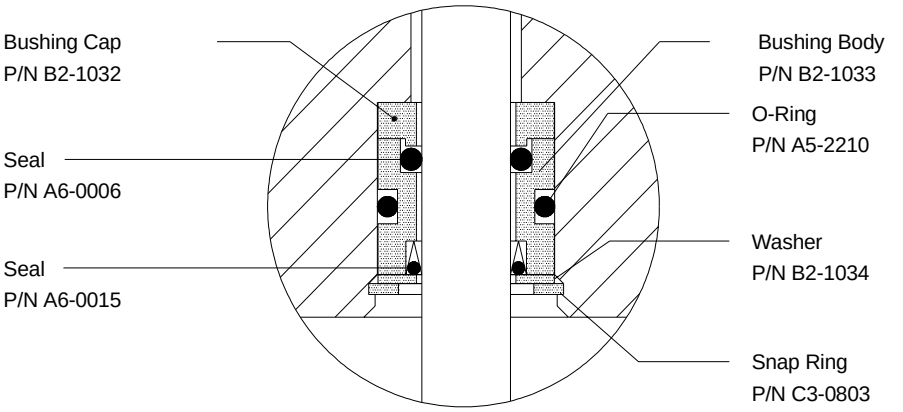
APPENDIX A: ILLUSTRATIONS

Hydraulic Mixing System-Accumulator,

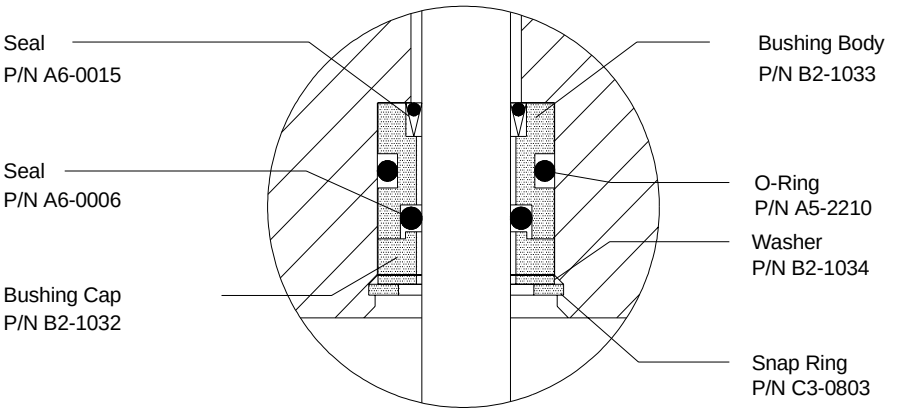
Figure 82



Hydraulic Mixer
Piston Assembly



Bushing Seal Assembly for
Precharge Inlet Head

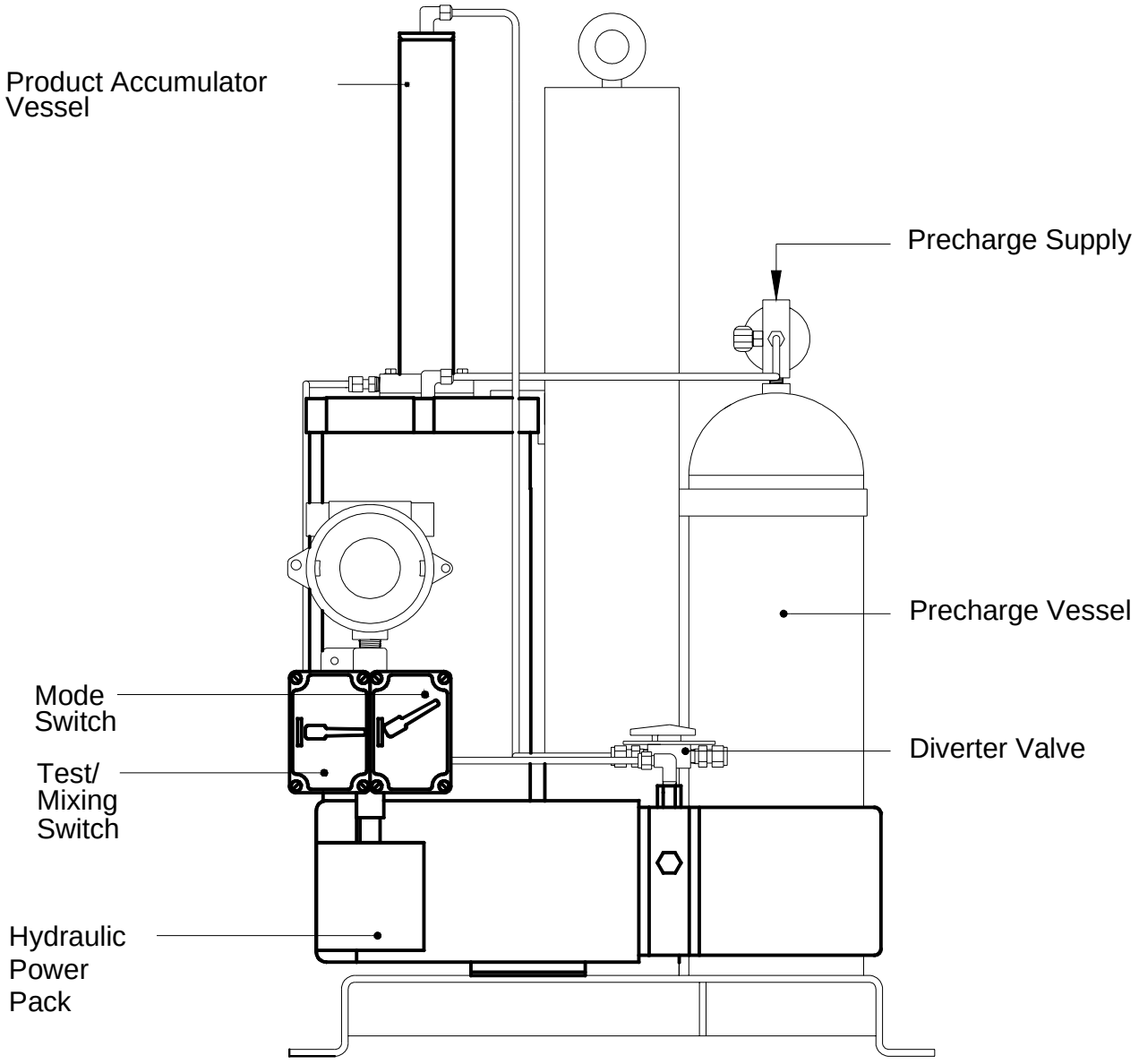


Bushing Seal Assembly for
Actuator Piston

APPENDIX A: ILLUSTRATIONS

Hydraulic Mixing System

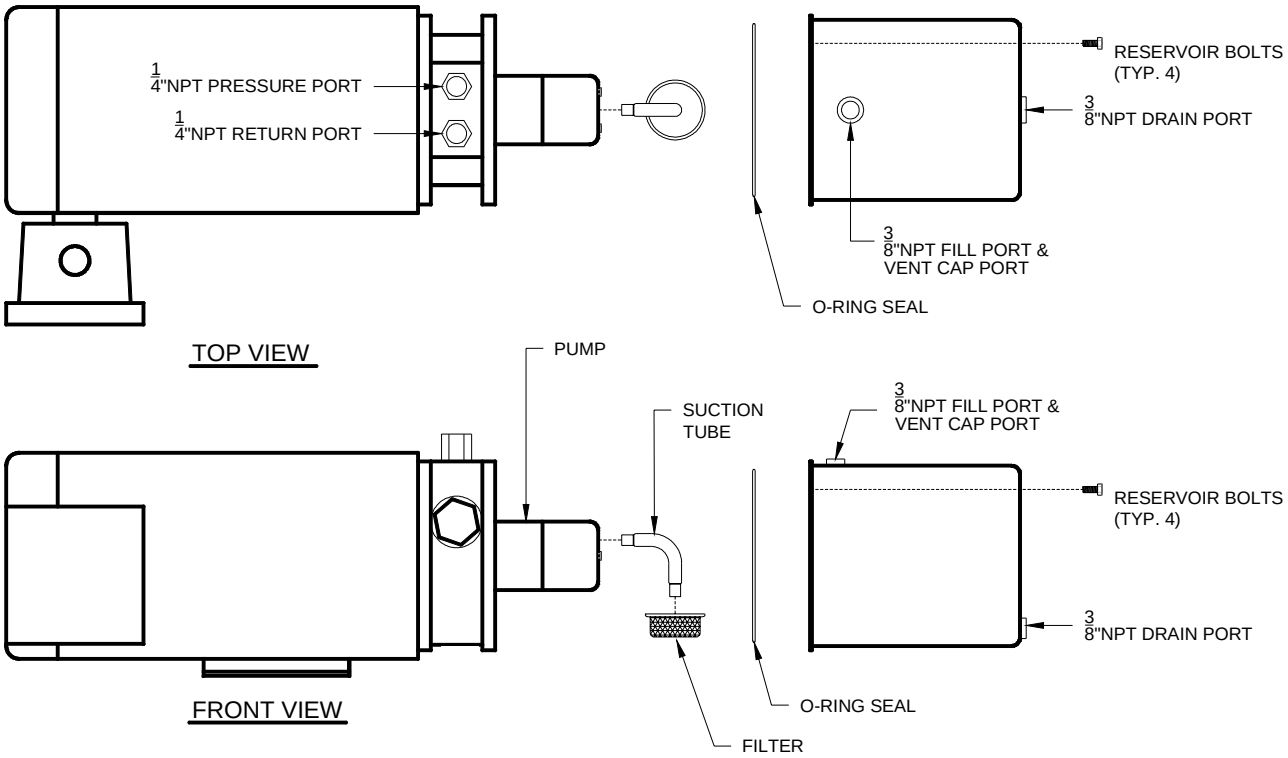
Figure 83



APPENDIX A: ILLUSTRATIONS

Hydraulic Power Pack

Figure 84

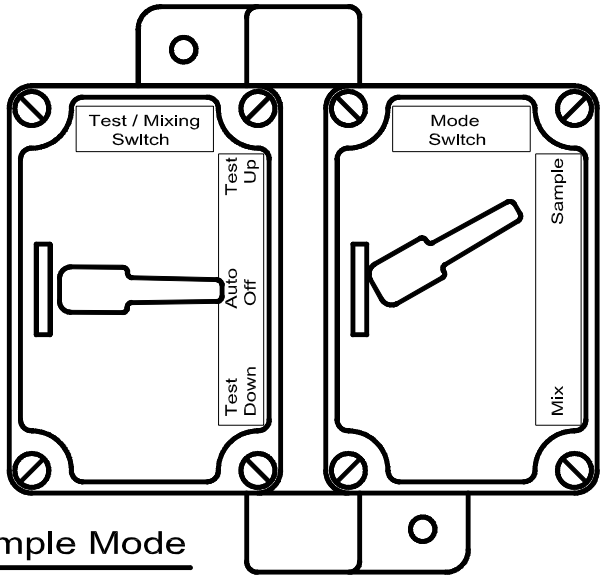


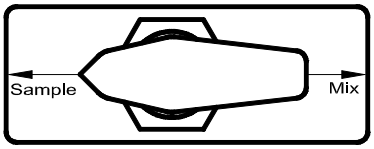
Pressure Test #1

Pressure Test #1a

APPENDIX A: ILLUSTRATIONS
Hydraulic Power Pack/Test Switch

Figure 85



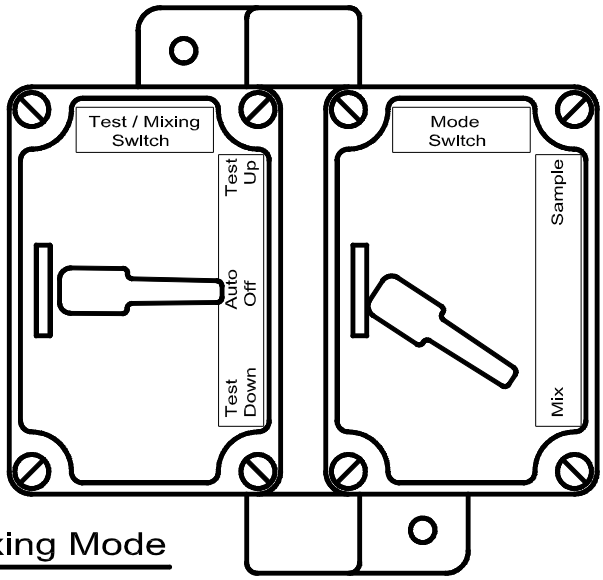


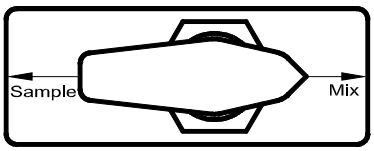
Diverter Valve

Sample Mode

In the SAMPLE MODE, the Diverter Valve should be in the SAMPLE position. Likewise, the mode switch should be in the SAMPLE position. This will enable the Test / Mixing switch to be used as a test switch to verify proper operation of the sample pump.

To verify the operation of the sample pump, move the Test / Mixing switch either up or down to test position and release.





Diverter Valve

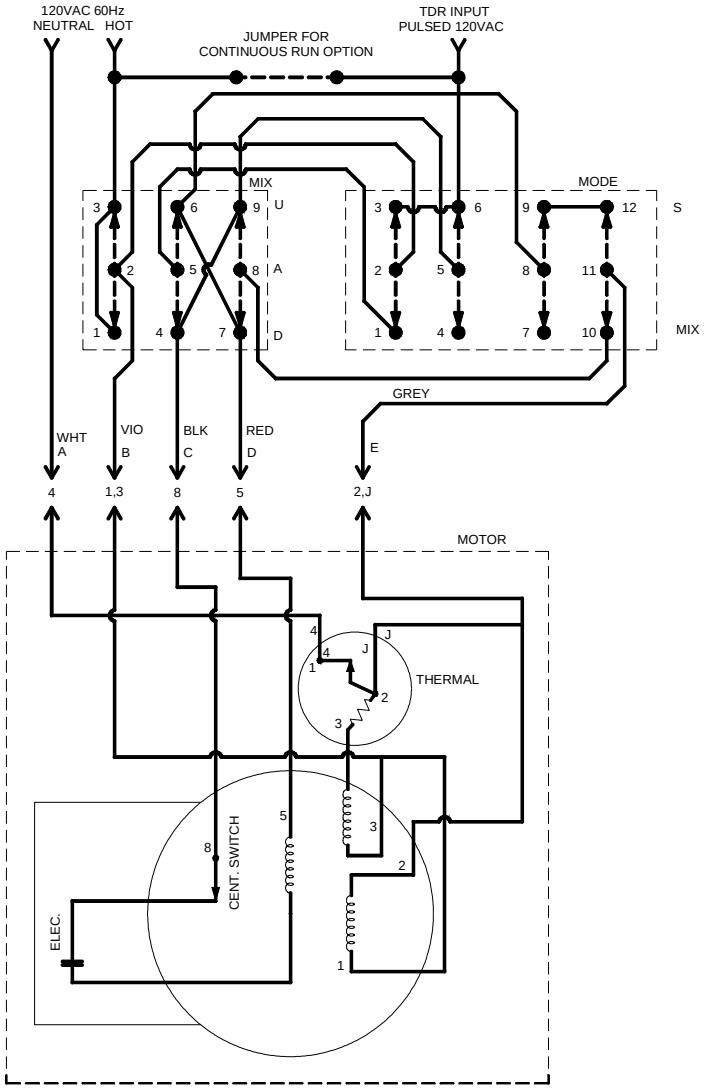
Mixing Mode

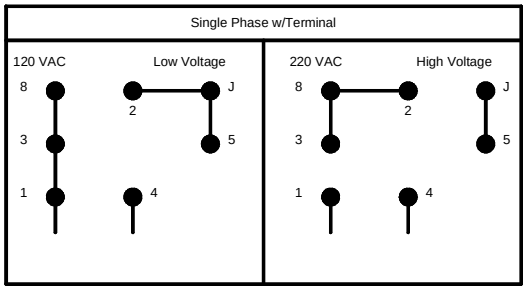
In the MIXING MODE, the Diverter Valve should be in the MIX position. Likewise, the mode switch should be in the MIX position. This will enable the Test / Mixing switch to be used as a mixing switch. In this position, the mixing rod and disc can be moved up and down through the product stored in the sample vessel to insure a homogeneous mixture.

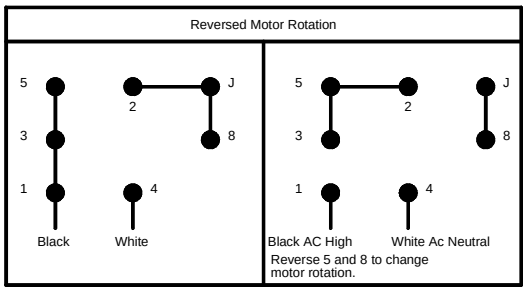
To mix product, move the Test / Mixing switch to the UP position. this will move the mixing disc up. Move the Test / Mixing switch to the DOWN position to move the mixing disc down.

APPENDIX A: ILLUSTRATIONS
Electrical Wiring, Hydraulic Power Pack/Test Switch

Figure 86





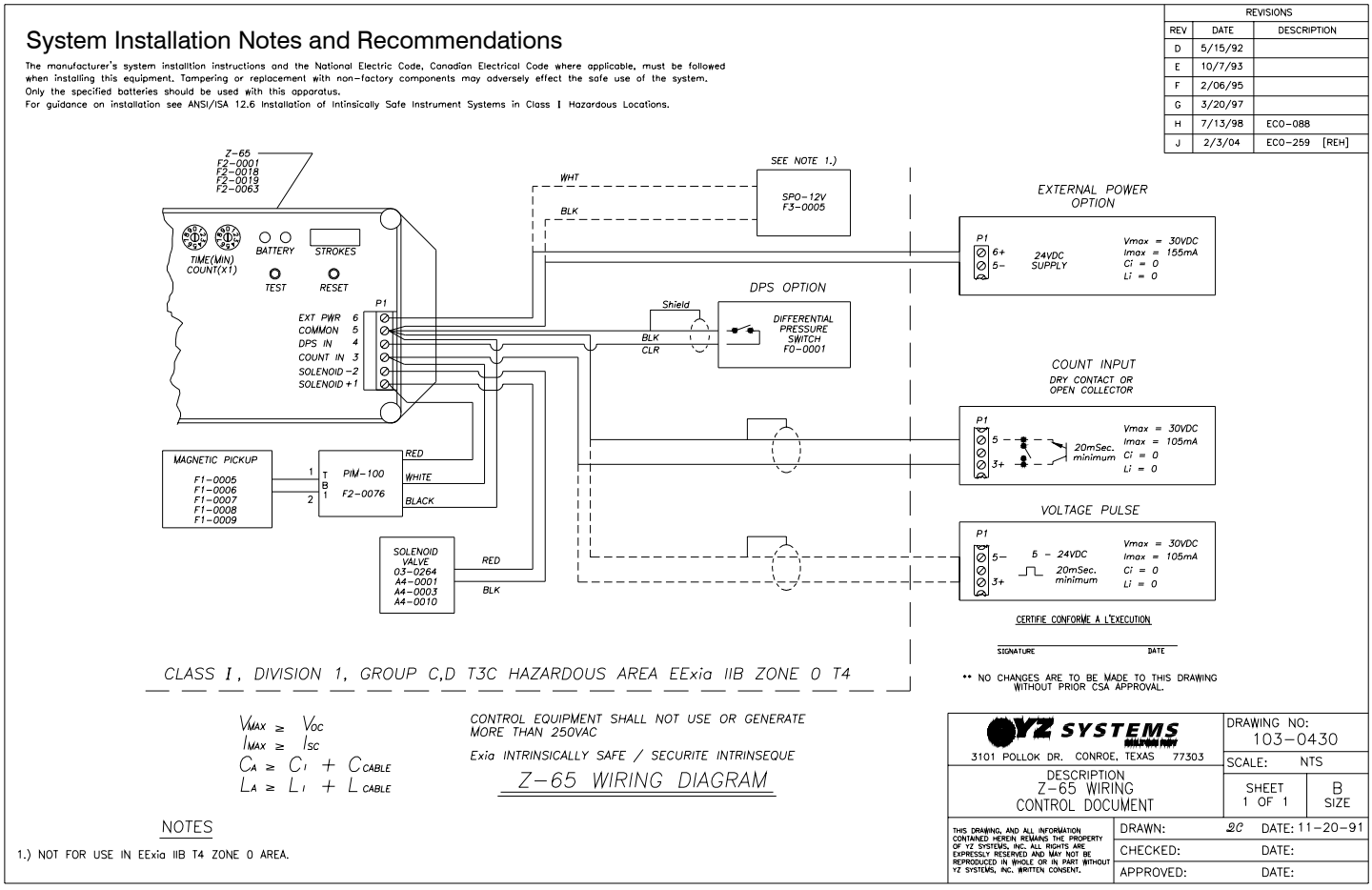


5 AND 8 ARE USED TO CORRECT FOR PROPER ROTATION OF THE MOTOR.
IF THE MOTOR DOES NOT ROTATE IN THE PROPER DIRECTION, SWITCH
5 AND 8 TO REVERSE.

APPENDIX A: ILLUSTRATIONS

Z-65 Wiring Control Document

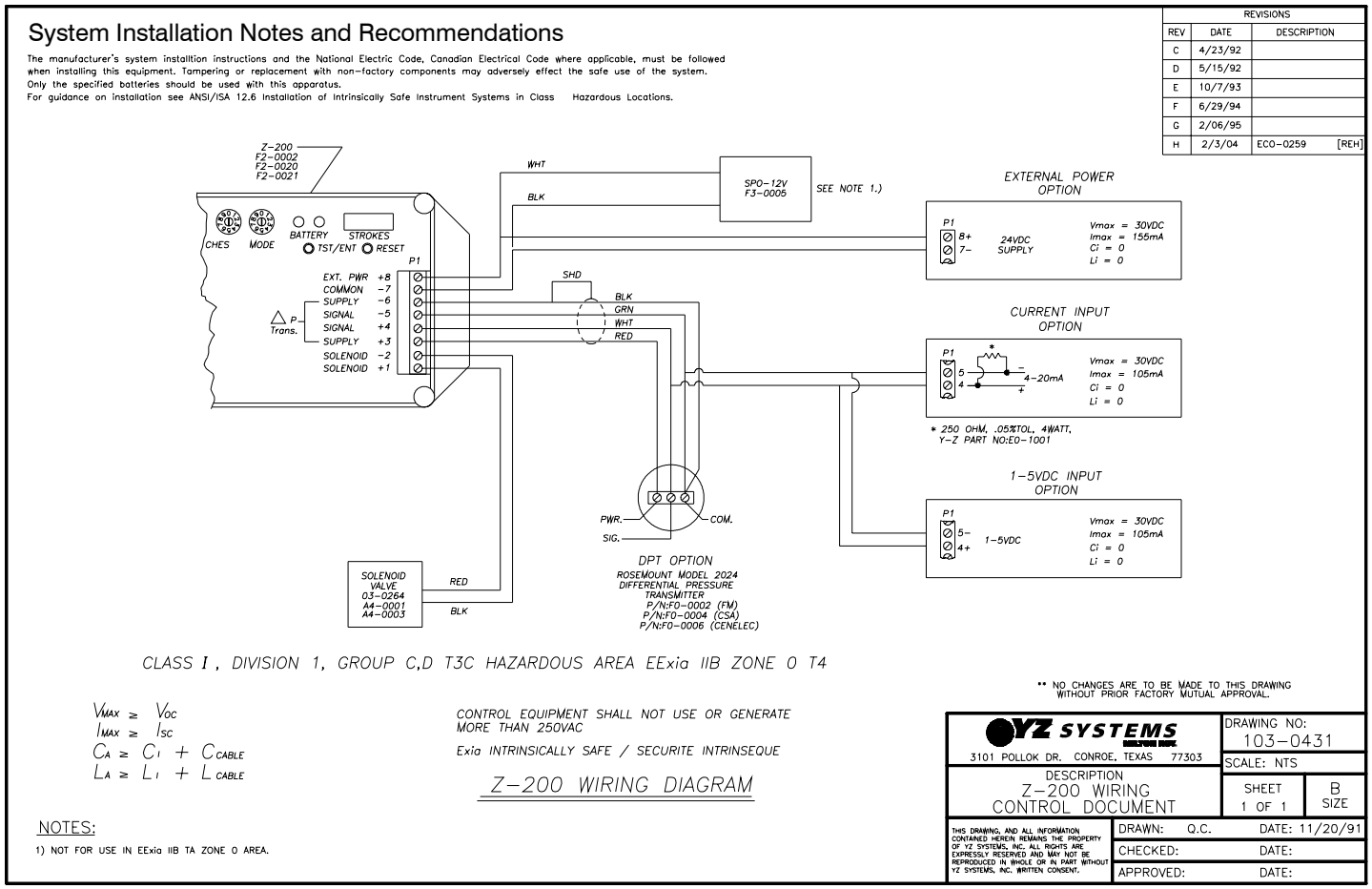
Figure 87



APPENDIX A: ILLUSTRATIONS

Z-200 Wiring Control Document

Figure 88



APPENDIX A: ILLUSTRATIONS

Notes

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